Railway Maintenance Engineer

Vol. 13 CHICAGO: Transportation Building NEW YORK: Woolworth Building JULY 1917 CLEVELAND: Citizens' Building WASHINGTON: Home Life Building No. 7

A Texas Stear

THEODORE RADEMACHER, of Section 9, Texas Midland Railroad, Quinlan, Tex., writes as follows under date of June 10, 1917:

"THE RAILWAY MAINTENANCE ENGINEER is the best as to information, practical knowledge and instruction for railway trackmen. All maintenance engineers and trackmen need your paper; and any roadmaster or track foreman who thinks that he can glean no practical information from the pages of the RAILWAY MAINTENANCE ENGINEER is simply standing in his own light."

RAMAPO

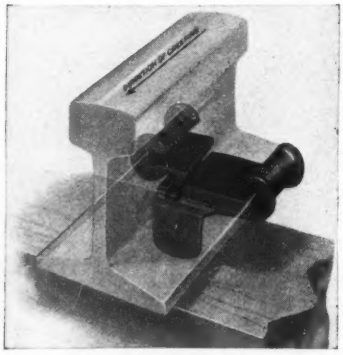
Automatic Safety Switch Stands are Manufactured only by the

Ramapo Iron Works

Write for Descriptive Catalogues on
Switch Stands, Switches, Frogs, Guard Rail Clamps, Etc.

Manganese Track Work a Specialty.

Ramapo Iron Works Main Office: HILLBURN, N. Y.
WORKS: Hillburn, N. Y., and Niagara Falls, N. Y.



THE P. & M.

RAIL ANTI-CREEPERS

EFFECTIVE — EFFICIENT
UNIVERSALLY USED

THE P. & M. CO.

RAILWAY EXCHANGE
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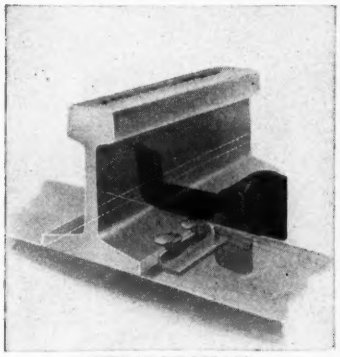


THE VAUGHAN

ESTABLISHED 1882

THE WEIR FROG CO.

Track Work of Rail and Manganese Steel Construction

CINCINNATI --- --- --- --- --- OHIO

CINCINNATI FROG & SWITCH CO.
Manufacturers of aids to
Smooth Riding Trains and Increased Life to Rolling Stock
Track Equipment for Steam and Electric Railroads, Mines and Mills
CINCINNATI, OHIO
Frogs Switches
Crossings Stands

Safeguard Your Water Service with Golden-Anderson Automatic Valves

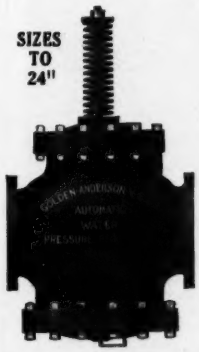
G.-A. Pat. Cushioned Controlling Altitude Valves

Automatically maintain Uniform Stage of Water in Tank, Reservoir or Standpipes. Do away with the Annoyances of Valves or Float Fixtures inside or Float Fixtures outside of tanks.

"Three Ways of Closing Valves."
1st—Automatically by water.
2nd—By Electricity, if desired.
3rd—By Hand.

"No Metal-to-Metal Seats"

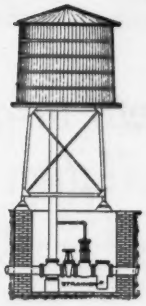
"Hosts of References"

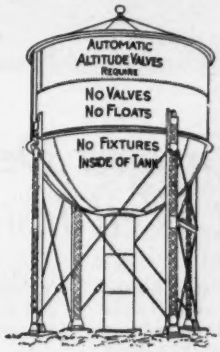


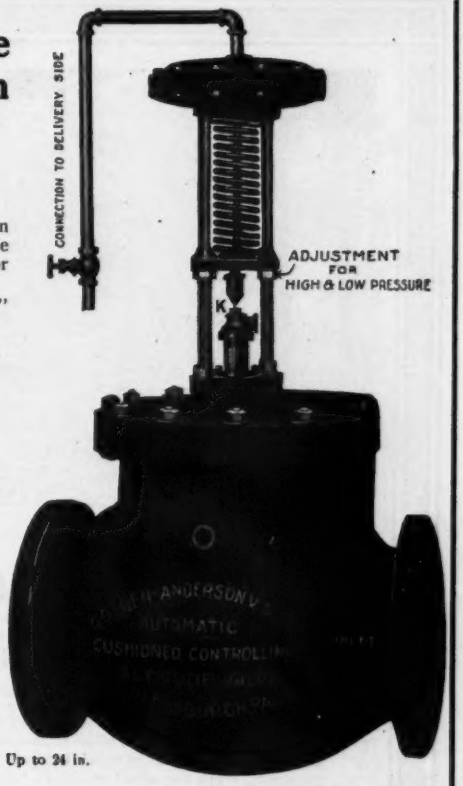
Golden-Anderson Patent Automatic Cushioned Water-Regulating Valves.

(Angle or Straight Way), up to 24 in

Golden-Anderson Automatic Cushioned Float Valves.







Up to 24 in.

Golden-Anderson Valve Specialty Co.

1200 Fulton Bldg. **Water and Steam Specialties** **PITTSBURGH, PENNA.**

Centrifugal Pumps for Fire Service

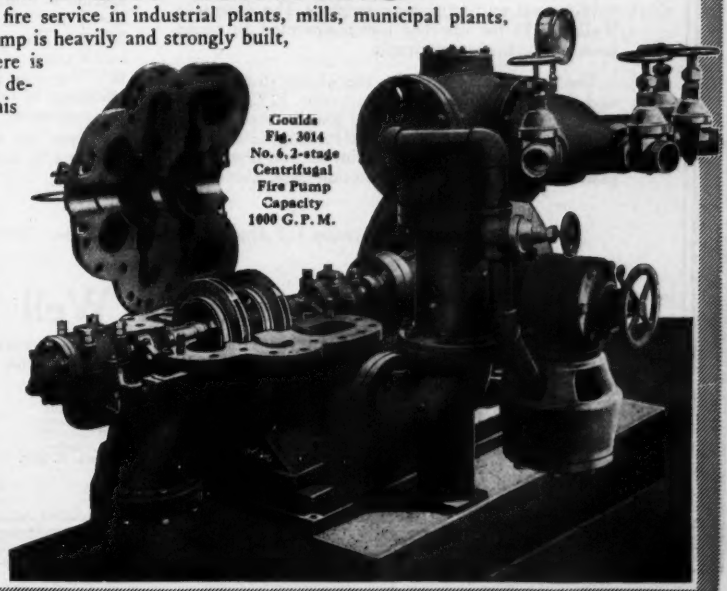
FOR DISCHARGING DIRECT INTO HOSE LINES OR FOR SERVICE WITH AUTOMATIC SPRINKLER SYSTEMS

This is a type of **GOULDS PUMPS FOR EVERY SERVICE**

which has met with great favor for fire service in industrial plants, mills, municipal plants, office and hotel buildings. While the pump is heavily and strongly built, the design is extremely simple. There is nothing to get out of order and cause delay when the pump is needed. This type of pump, is built in accordance with the Fire Underwriters specifications and has been fully approved by them.

Furnished for capacities from 500 to 1500 G. P. M. for total heads up to 150 pounds. They can be supplied for direct connection to either electric motors or steam turbines.

Our Bulletin 118 contains complete data



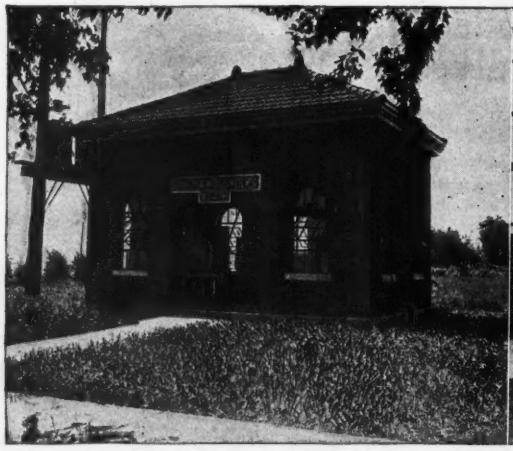
Goulds Fig. 3014 No. 6, 2-stage Centrifugal Fire Pump Capacity 1000 G.P.M.

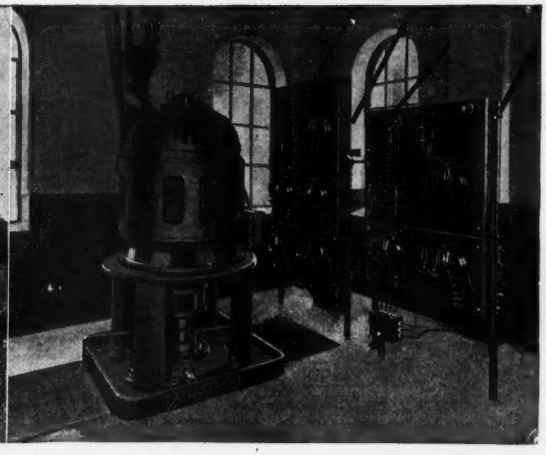
THE GOULDS MFG. CO.

Main Office and Works
Seneca Falls, New York

Branch Houses	District Offices
Boston	Pittsburgh
New York	Atlanta
Philadelphia	Baltimore
Chicago	Houston

AMERICAN





Pumping from Greatest Depth in a Municipal Unit Well Installation

In the new unit well water supply system for the City of Aurora, Illinois, what is known as the Talma Street Pump is of special interest because it is pumping from the greatest depth below the surface of any pump of this type installed for municipal service.

The well is 2200 feet deep, the first 300 feet of which is cased with 18 in. O.D. casing, below which the well is entirely in rock and is 15 in. in diameter.

During the time this well was being drilled the City of Aurora gave The American Well Works an order for a combination deep well turbine with booster centrifugal, mounted on the same shaft at the surface, to be installed in this well, the pump being designed to deliver 1000 g.p.m. from a depth of 100 feet below the surface and pumping against 65 lb. pressure at the surface.

At this point the well had a much smaller delivery than anticipated and to obtain more water the pump was lowered another 100 feet. From this depth the water supply was still less than the requirement and an order was given The American Well Works for another pump designed to pump from a much greater depth.

This pump is shown in the above illustrations and is an "American" 17-in. type KT2NT7MB combination deep well turbine and booster centrifugal fitted with thirty-eight 8-ft. lengths of 10-in. supporting pipe and 40 ft. of 9-in. suction pipe which places the opening in the suction pipe about 360 ft. below the surface. In this pump the shaft is 2-in. nickel steel and all impellers and diffuser vanes are made of bronze.

The pump was designed to discharge 550 gallons of water a minute against a total head of 497 feet when running at 1150 r.p.m. and an overall efficiency of 58% was guaranteed.

The official test of this pump after the installation was completed made in accordance with rules laid down by the city's consulting engineer, Mr. Dabney H. Maury of Chicago, shows that the pump delivers 650 gallons of water a minute against a total head of 497 ft. with an overall efficiency of 61% and 800 gallons of water a minute against a total head of 416 ft. with an overall efficiency of 56%.

After the official test the Mayor desired another test run of the pump when discharging directly into the mains. The result of this test shows that the pump discharges 630 g.p.m. against a total head of 497 ft. when running at a speed of 1172 r.p.m. with an overall efficiency of 61% and 760 g.p.m. against a total head of 446 ft. when running at a speed of 1167 r.p.m. with an overall efficiency of 59½%. The performance curve shows the pump had a range of from 450 g.p.m. at 558 ft. total head to 750 g.p.m. at 446 ft. total head with an overall efficiency of not less than 59% which is 1% above the guarantee.

Where the well is straight and plumb this type of pump is unequalled for large capacity deep well pumping.

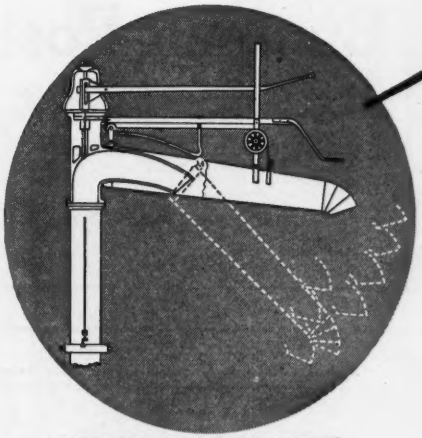
Catalog 132 describes these pumps. Write for it.

The American Well Works

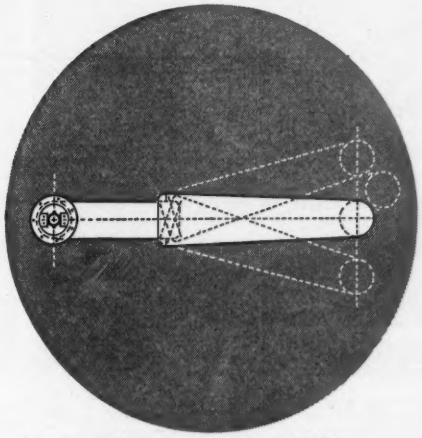
General Office and Works: Aurora, Ill.
Chicago Office: First National Bank Bldg.

Sales Agencies:

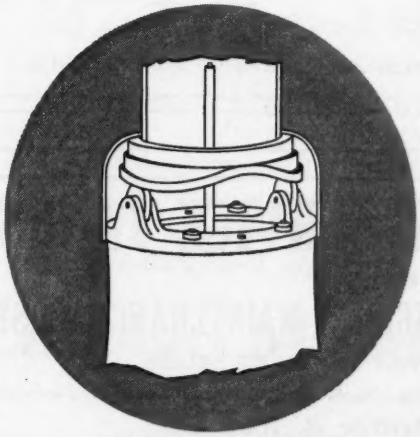
New York City	Dallas, Texas	Denver, Colo.	Edmonton, Alta.
Philadelphia, Pa.	Birmingham, Ala.	San Francisco	Calgary, Alta.
Pittsburgh, Pa.	Kansas City, Mo.	Salt Lake City	Chatham, Ont.
St. Paul, Minn.	Joplin, Mo.	Los Angeles	Montreal, Que.
St. Louis, Mo.	Lincoln, Nebr.	Artesia, N. Mex.	



SHOWING VERTICAL RANGE FENNER DROP SPOUT



SHOWING LATERAL RANGE FENNER DROP SPOUT



GRAVITY TURNING & LOCKING DEVICE

Its Quicker-Easier-Safer

to fill your tender tanks with

POAGE *Style* "H" WATER COLUMN

Equipped with

Fenner Drop Spout

Quicker and Easier because the spout can be instantly brought into play without accurately spotting the tender. It works equally well with tenders of different heights. The spout has a vertical range of five feet and a lateral range of three.

The spout is non-freezable. Heavy icicles will not gather upon it. There is no packing at the open telescopic joint, yet, it does not leak a drop of water.

Safer—as soon as it is released the spout swings by gravity to a position parallel with the track and remains there locked. There are no unsafe locking devices to be operated.

The three foot lateral range of the spout prevents the column being tipped over if the tender shifts unexpectedly.

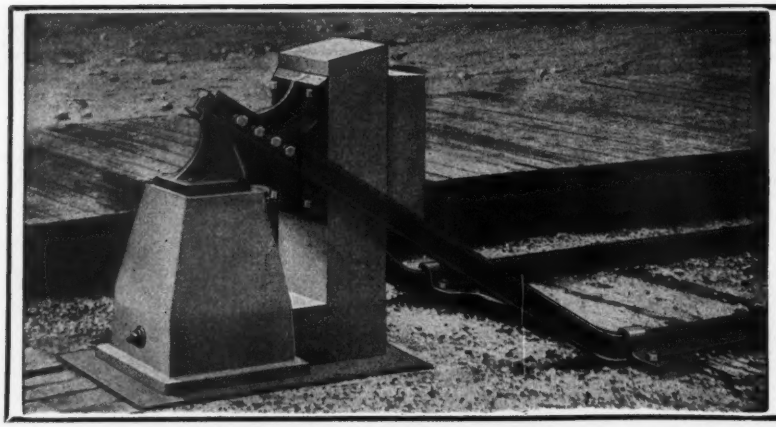
There is no danger of water hammer bursting the mains. The Poage Style H valve shuts off 85 per cent of the flow very quickly and the remaining 15 per cent more slowly—the correct principle to secure quick closure without water hammer.

Try the Poage Style H Water Column—It's better.

MANUFACTURED EXCLUSIVELY BY

The AMERICAN VALVE & METER COMPANY

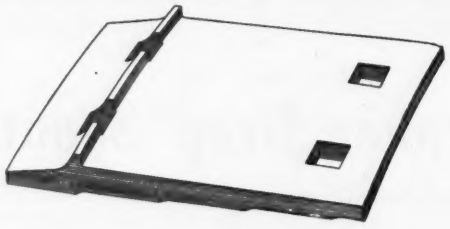
CINCINNATI, O.



ELLIS
PATENT
Bumping Post

Simple, Strong and Lasting
Adapted to All Positions

Mechanical Manufacturing Co.
Chicago, Ill.



THE LUNDIE TIE PLATE

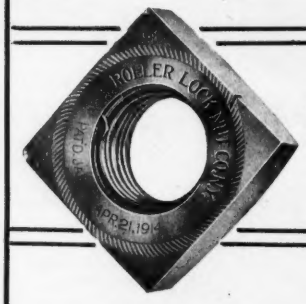
The Lundie Tie Plate is widely acknowledged by railroad men having such plates in track, as promoting decided economy in rail wear, in holding track to gauge and in giving easy riding track. It will far more than pay for itself in reduction of Operating Expenses.

The features of the plate are—a sloping seat inclining the rail, so reducing abrasion and internal stresses in the rail to a minimum—a true camber promoting easy riding—and a bottom as shown in the cut, so seating itself on the tie that the track is held firmly to gauge without injury to the tie.

The combination of these features, or their mechanical equivalent, is covered by Letters Patent, supported by other Patents covering certain individual features of the plate. Railroad Companies pay no royalties on its authorized use.

The undersigned, as the original promoter of the principles embodied in the Lundie Tie Plate, offers plates for sale in fair competition with any other plate in the market, depending on its proven merits for its extended use.

JOHN LUNDIE, 52 Broadway, NEW YORK



At Last—A
Self Tightening Track Nut

Just think what that means—a nut that will tighten under vibration, automatically take care of bolt stretch and keep everything snug and tight. There's less wear and tear on tracks and greatly reduced maintenance cost when you use

Roller Lock Nuts
for Crossings, Frogs and Switches

This nut is applied like a plain nut—tightened with a wrench, and it automatically locks. No counter nut is required.

A strong wrench pull unlocks the Roller Lock Nut. It is quickly removed and can be re-used any number of times. Let us tell you the story in detail—and send samples.

Roller Lock Nut Co., Inc.
61 Broadway New York

Capacity, 60,000 gallons. Height, 36 ft. 8 in. to top.

STEEL RAILWAY SERVICE TANKS
FOR
PERMANENCE AND NEGLIGIBLE MAINTENANCE COST

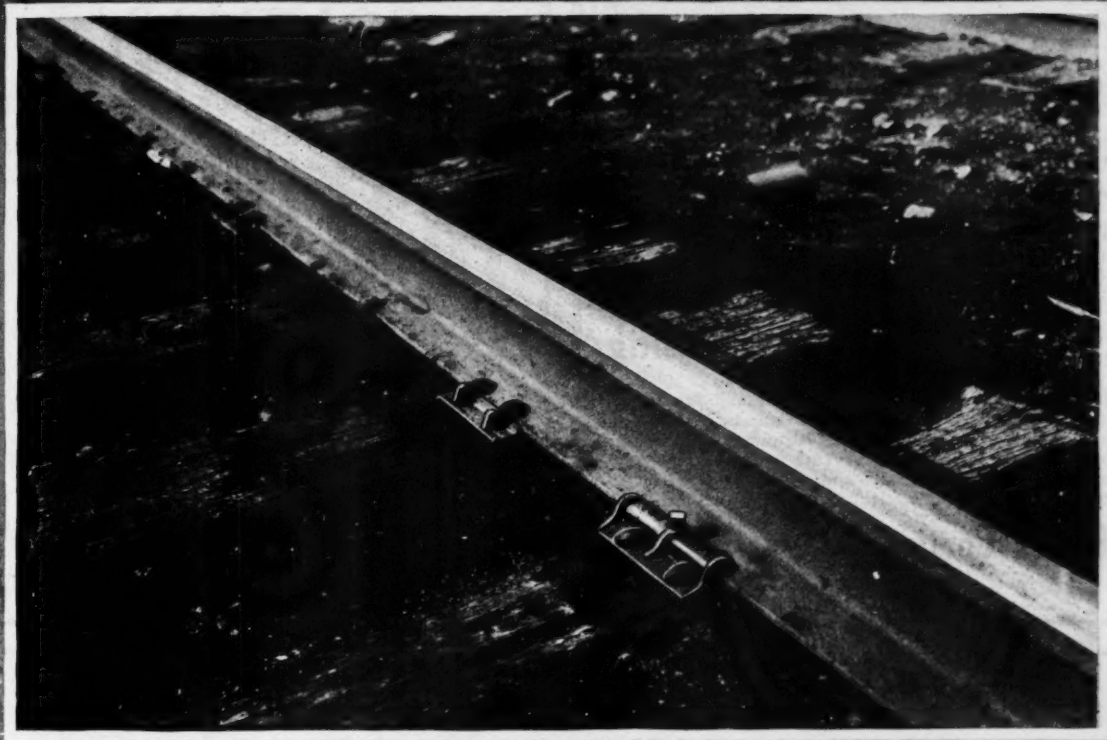
WRITE FOR RAILWAY BOOKLET NO. 28

We manufacture and erect Elevated Steel Tanks and Standpipes for every service

Des Moines Bridge & Iron Co.
Des Moines, Iowa, 912 Tuttle St.

Pittsburgh-Des Moines Steel Co.
Pittsburgh, Pa., 920 Curry Building. New York City, 55 Church St. San Francisco, Cal., 5000 Rialto Building. Chicago, Ill., 1290 First National Bank Bldg. Havana, Cuba, Room 165 Nova Scotia Bank Building. Dallas, Texas, 1285 Praetorian Building. Chatham, Ont., 299 Inshes Ave.
Plants—Pittsburgh, Pa. Des Moines, Ia. Chatham, Ont.

THOMAS

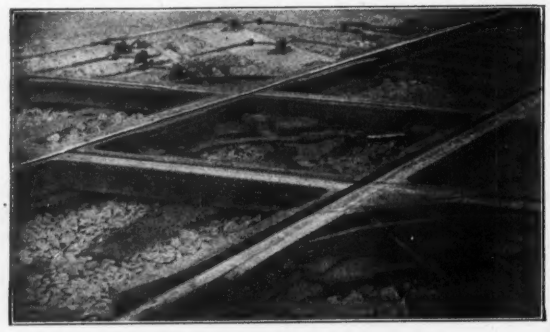


Rail Anchor Tie Plate

The Thomas Rail Anchor Tie Plate holds the rail where anti-creepers, rail braces and tie plates have failed.
It is a positive rail anchor and perfect tie plate.
The tie must go with it the same as slotted angle bar spiked to the tie.
It controls each length of rail itself between its limits of expansion and contraction.
It prevents rail from traveling when traffic is reversed.
It holds the joint ties in their original position, keeping them from working or pumping.
It gives complete control—not half control.
The "Wail of the Rail" treats the subject interestingly.
Shall we send you a copy?

Chicago Malleable Castings Company

General Offices and Works: 120th Street and S. Racine Avenue, West Pullman, Ill.



Eliminate The Cause

The proper way to cure any evil is to eliminate the cause. The evils due to the open throat crossing are well known to all railway men. Why not eliminate the cause of the trouble by installing the

Eymon Continuous Crossing

It bridges the gap between the rails and provides a smooth, continuous surface for the wheels. It reduces the maintenance costs more than 100 per cent, increases the life of the crossing by several years and provides greater safety to both rails and equipment. Send for records of service tests. It has stood the test of time.

Eymon Continuous Crossing Co.
MARION, OHIO

KILBY FROG & SWITCH COMPANY

Birmingham, Alabama

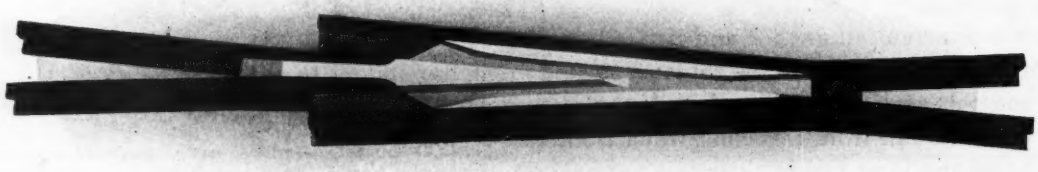
Manufacturers of

Frogs, Switches, Crossings, Etc.

Manganese Track Work a Specialty

Still other REASONS WHY You Should ADOPT the M.T.S. Standard Rail-bound MANGANESE STEEL FROG

In preference to any other design



In the May and June issues of the Maintenance Engineer we have given you SIX GOOD REASONS why you should standardize on this frog. Now, here are four more:

7. The heel rails, through an offset bend before planing, are given an effective splice bearing on the Manganese Steel heel-block extension. More bolts are used to secure the heel rails than usual heretofore.
8. The extent of the Manganese Steel casting is considerably greater than in most other designs, and is based on observation of what is needed.
9. The more general adoption of this frog as standard will result in economy to the user as well as the manufacturer.
10. When you specify "M. T. S. Standard Design" on your requisitions, your Purchasing Agent will know exactly what you want and all manufacturers will be figuring on the same construction.

Detail drawings of this frog, of any standard angle from No. 4 to No. 20, gladly furnished upon request.

NEXT MONTH WE WILL SHOW YOU HOW THIS FROG LOOKS COMPARED WITH OUR FORMER, POPULAR DESIGN A-91 FROG.

MANUFACTURED BY

WM. WHARTON JR. & CO., Incorp., Easton, Penna.

What Is Your Cost of MAINTAINING CROSSINGS?

INTERNATIONAL
STEEL CROSSING FOUNDATIONS

Cut This Item—75%

Did you ever analyze your maintenance charges per crossing per year?

Do you realize that this item averages approximately $75.00 per year per crossing frog? Quite a sum of money to be spending for these short sections of your roadway. Isn't it?

Why not reduce it 75% by substituting our steel crossing foundations for your wooden ties. The savings made possible in this direction soon pay the first cost of the foundations.

In addition, these foundations will prolong the life of your crossing frogs and furnish, for all time, perfectly balanced riding. These are not theoretical claims but the experience of users. Let us prove it to you.

Our new catalog will be of interest and value to you. We will send a copy on request.

Prompt deliveries made from stock.

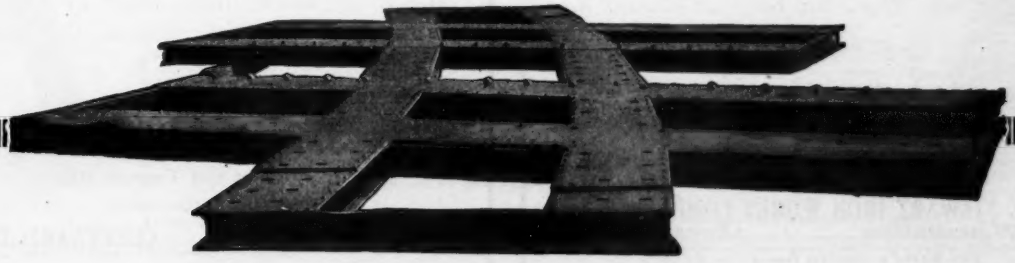
The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES

Western Eng'g Sales Co., Los Angeles, Cal. | San Francisco, Cal. Seattle, Wash. | R. J. Cooper Co., Salt Lake City, Utah | J. E. Lewis & Co. Dallas, Texas. | Maurice Joy, Philadelphia. | William H. Ziegler, Minneapolis, Minn.

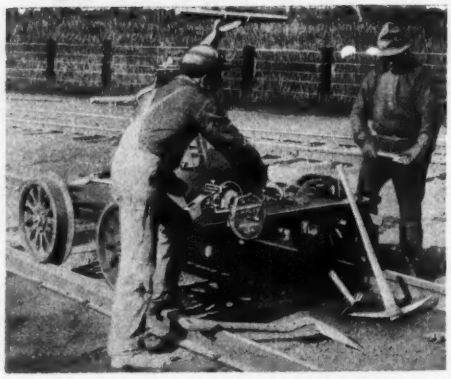


Will Save 80% of Your Edge-Tool Expense

Keystone Tool Grinder

One for Every Gang—an investment that will save your road every year many times the initial cost. Sharp tools mean more and better work. Saves the time and trouble of sending tools back to shop. Eliminates investment in extra tools. Any unskilled laborer can operate the Keystone Grinder, and every tool is sure of being accurately and correctly edged.

Scythe Attachment; Adjustable For Any Width or Bevel.



KEYSTONE FEATURES

Absolutely simple; only two gears; nothing complicated; complete set of attachments, the simplest ever designed. End-tapered shaft, handle cannot work loose; tool rest adjustable to any position, cannot work loose; absolutely dust-proof bearings; requires oiling but once a year. High speed; geared 16 to 1; little hand power required; no fatigue. Compact, portable; built for strength and efficiency.

The Original Tool Grinder Designed for Railroad Use—There is no grinder on the market, irrespective of price, that will do the work of the Keystone and its attachments. *Make us prove it.*

If your road has not adopted the Keystone Grinder, use one for six months at our expense. If you do not find it *superior* and more satisfactory in every respect than any other grinder on the market—it costs you nothing.

Write Today for the Railway Bulletin

Keystone Grinder & Mfg. Co.
PITTSBURGH, PA.

Low Maintenance Cost

easy installation and longer service *dictate* the use of

STEWART IRON FENCE
"The Standard of the World"

for all work at stations or within switching limits for intertrack fence, right-of-way fence and concourse enclosures.

Stewart fence and gates are built to meet your particular problem in handling crowds, protecting property and preventing damage suits.

Scientifically designed. Last a lifetime.

Experience records of leading roads prove Stewart fence the cheapest and best protection in the long run. Write for catalog. State your problem and get the facts to-day.

Iron and wire window guards, wire partitions for baggage rooms, store houses and tool rooms.

THE STEWART IRON WORKS COMPANY, Inc.
700 Stewart Block Cincinnati, Ohio

"The World's Greatest Iron Fence Builders"

SHERWIN-WILLIAMS

RAILWAY LINE

Shortest Route to Best Results
A Paint Product for Every Railway Use

Metalastic

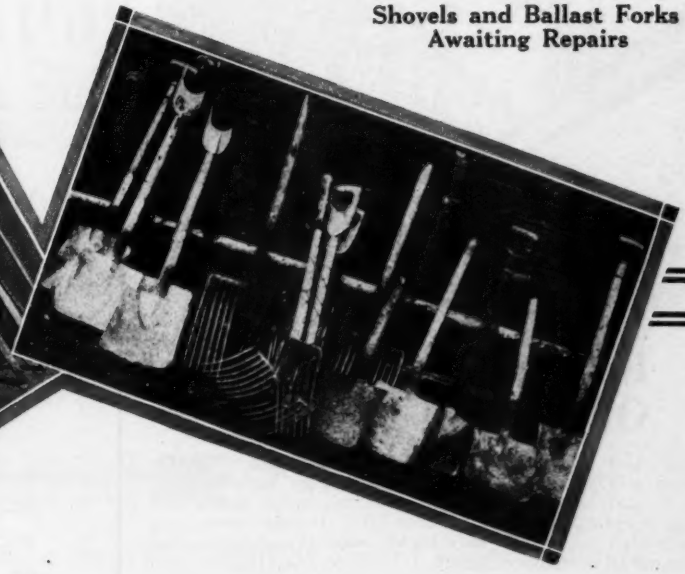
A perfectly balanced combination of Carbon, Graphite and Silica, ground in pure linseed oil. For the efficient protection of metal. Specify Metalastic. Black, Brown, Green, Gray. Dries hard enough to resist abrasion, yet remains elastic and flexible.

THE SHERWIN-WILLIAMS CO.
Railway Paint and Varnish Makers
Address Inquiries to
798 Canal Road, N. W. CLEVELAND, OHIO

Not a HUBBARD Here

Track Tools Awaiting Repairs

Shovels and Ballast Forks Awaiting Repairs



CLAW BAR

V-head Tamping Pick

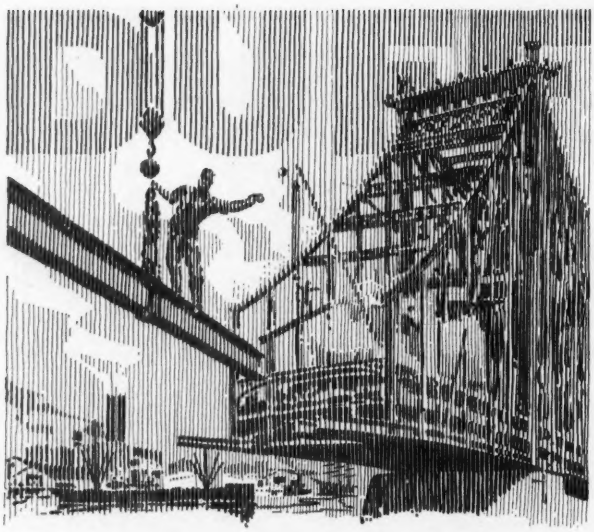
HUBBARD
Shield H Brand
Shovels and Track Tools

The growth of this concern during more than a half century is based on its ability to maintain a high standard of quality. Throughout these many years the users of Hubbard tools have always been aware of the fact that not only are Hubbard tools all that is excellent in material and workmanship, but that they cost less in the end.

Write for catalogues and ask for prints of any tools which you specially desire.

Tamping Shovel

HUBBARD & COMPANY
Pittsburgh, Penn'a.



Reduce The Hazards Of Bridge Building

The fact that Lifting Jacks play a big part in bridge building and that much depends upon them makes it imperative that they be not only powerful, quick acting and easy to operate and repair, but also safe. Poorly constructed Jacks loaded to capacity may break under the strain and be the means of a costly calamity.

DUFF-BETHLEHEM
Forged Steel
HYDRAULIC JACKS

for years have been recognized as the safest and most efficient Hydraulic Jacks ever produced. The name and reputation of the world's largest manufacturers of Lifting Jacks stand back of them.

They are 30 per cent. to 60 per cent. lighter than any other make of Hydraulic Jack of similar stroke and capacity. All inside parts are forgings, other parts are of bronze. Only eleven interior parts are used. Complete illustrated catalogue will be sent upon request.

Makers of

Duff GENUINE BARRETT Track Jacks
Duff GENUINE BARRETT Car Jacks
Duff Ball Bearing Screw Jacks
Duff High Speed Ball Bearing Screw Jacks
Duff Bethlehem Hydraulic Jacks
Duff Journal Box Jacks

The Duff Mfg. Co.
Established 1883 PITTSBURGH, PA.
New York Chicago Atlanta
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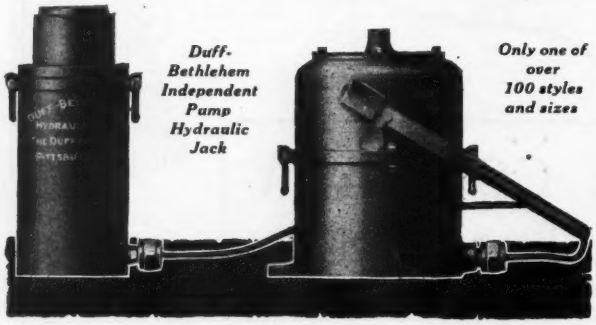


Duff-Bethlehem Independent Pump Hydraulic Jack

Only one of over 100 styles and sizes

Long Time Protection

is given to steel cars, bridges, water and locomotive tanks, signal apparatus and all exposed metal and wood work by

DIXON'S SILICA GRAPHITE PAINT

The LONGEST SERVICE paint. Nature's combination of flake silica-graphite, mixed with pure boiled linseed oil, is the ideal combination which forms a firm, elastic coat that will not crack or peel off. This prevents access to agents which corrode and injure the metal. Dixon's Silica-Graphite Paint is used throughout the world by railroad engineers.

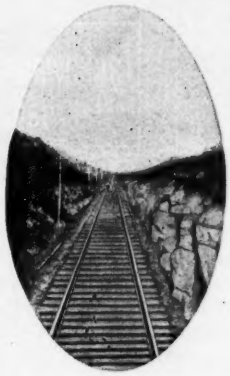
Why not write us for long service records and booklet No. 187B?

Made in JERSEY CITY, N. J., by the

Joseph Dixon Crucible Company

Established 1827

A Mile Of Clean Track Within A Single Barrel



A MILE of clean track within a single barrel. A mile of track cleared of weeds and grasses, *quickly, surely and economically,* by means of a sprinkler tank rigged by your own men and

TRACKOLINE "The Weed Killer"

The elimination of vegetation from that right of way of yours demands no expensive outfit, and entails no expense for high priced "Experts," provided you use **Trackoline.**

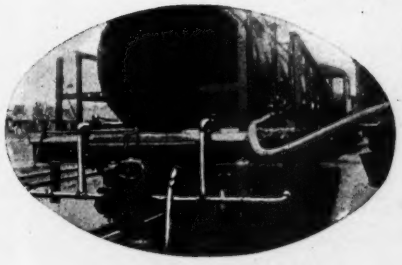
Trackoline banishes vegetation —true, but it is also true that it banishes a large part of the expense other methods involve.

Guaranteed *"Cattle Proof."* Harmless to rails, ties or superstructure. Expert Maintenance officials know that when it comes to weeds they have a real Weed killer in **Trackoline.**

TRACKOLINE the highly concentrated chemical, which does just what it was designed to do, *"Kill every weed, top, root and seed,"* which not only assures a clean track for the balance of the season, but, due to its Sterling, Sterilizing Efficiency, greatly retards the growth of even the most hardy vegetation the following season.

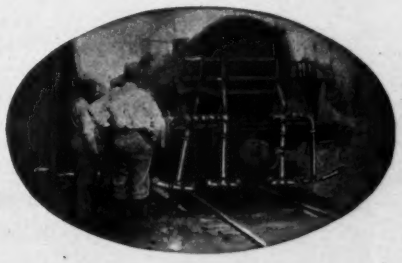
REMEMBER—Labor is scarce, labor costs high. —Grass and weeds are preparing for their rapid growth on that Right-of-Way of yours.

There is a Mile of Clean Track in in each barrel of TRACKOLINE.



Send today for Trackoline Tracts or Facts on Clean Tracks and Lean Expenditure for the Prevention of Vegetation, through use of

TRACKOLINE



PROTECTIVE MATERIALS CORP.

Vanderbilt Bldg., 51 E. 42nd Street New York, N. Y.

"MILE for MILE the most highly developed Railroad in America."

As assistance in maintaining this slogan the Lackawanna uses

"IMPERIAL" TAMPERS

"Imperial" Pneumatic Tampers have proven their ability to improve upon the most careful hand tamping. They effect a more evenly and firmly tamped and more smoothly riding roadbed. The labor cost is much less than that of hand work.

"Imperial" Tampers and Imperial Portable Compressor cars are in extended use on a great many railroads. A first-hand report from a neighboring road will convince you that this equipment will reduce maintenance cost of your trackage.

We will be glad to send you Bulletin 9023.

11 Broadway NEW YORK **INGERSOLL-RAND COMPANY** 165 Q. Victoria St. LONDON

Steel for Service

This cofferdam at Binghamton, N. Y., built by the Foster Construction Company of Newark, N. J., was unwatered in sixteen minutes (an average depth of water of five feet) by an 8" x 6" and a 5" x 4" centrifugal pumps.

Watertightness is one of the several good qualities of

United States Steel Sheet Piling

The mark of quality

It protects the user

Carnegie Steel Company

General Offices—Pittsburgh, Pa.

781

Are you saving Man-Power?

It takes the labor shortage to show you the extravagance of push trucks. You can't meet the shortage in man-power while you are wasting muscle in work that can be better done electrically.

The price of push trucks is about the same all the time, $5 to $100, but the price of labor is rising and laborers are getting fewer every day.

You pay less for push trucks. You must pay more for labor. Pay for an electric truck now and stop paying for unnecessary labor.

Refuse to consider the first cost of your trucks. Add the labor and you will buy electric trucks.

That's what sold Buda Trucks to the Santa Fe, the Pere Marquette, the C. B. & Q., the Soo Terminal warehouse and others.

New catalog just off the press will be sent on request.

THE BUDA COMPANY

608 Railway Exchange Bldg.,

Chicago

Just Look at Joe!

POOR fellow!

It's only three o'clock and Joe is nearly down and out. He's tired—winded—hardly able to move.

He feels as if he'd been on the job since yesterday.

But how about work?

Joe still has a couple hours of work ahead of him.

Will he be able to give his boss two hours of real productive work?

No, sir! Not one chance in a thousand.

Joe is all played out and here is the reason.

Just look at his pump car!

It is equipped with those old-fashioned plain bearing boxes.

They are the real trouble-makers.

No wonder a great many roadmasters have nicknamed them "back-breakers."

Just see what they've done to Joe.

This morning when he started out to work, he was feeling "fit as a fiddle"—he was whistling a gay old tune.

Now he's tired and discontented.

Don't you realize that a fellow in such a condition actually loses money for your road every day.

Why be behind the times?

Throw away those old-fashioned plain bearings.

Supply Joe with equipment that will make him feel "fit as a fiddle" right up to quitting time.

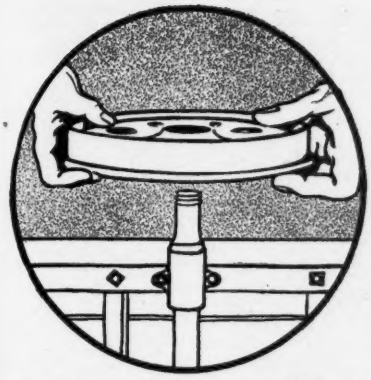
Get those Hyatt Roller Bearing Replacement Boxes.

Convert Joe's pump car—and all the other fellows' cars—into easy rolling equipment.

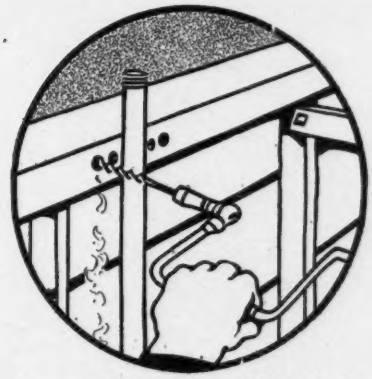
Eliminate the sweating and puffing and you will be surprised to see how much better the men will work.

Don't wait until you need new equipment. Start the good work at once by getting those Roller Bearing Replacement Boxes.

HYATT BEARINGS



First take off the wheels and the old-fashioned plain bearing boxes.



Next you drill two new bolt holes in the car sill.

Then put Hyatt Bearing Replacement Box in position and bolt in place.

NOW let's consider your motor cars, too.

You know that it requires power to overcome the friction of the old-fashioned plain bearings.

And with the present high cost of gasoline, power becomes a mighty expensive proposition.

Then why waste it trying to overcome plain bearing friction?

A great many exhaustive tests have proven that a motor car equipped with Hyatt Roller Bearings will reduce the gasoline consumption by at least one-third.

And this is not all.

Cars equipped with Hyatt Roller Bearings will only require lubrication about three or four times a year. Compare this with your plain bearing cars that must be lubricated practically every day.

There you have the two big reasons explaining why the Lehigh Valley, New York Central, Pennsylvania Lines, Southern Pacific, and forty-one other large railroads in this country have installed Hyatt equipped service cars.

Even in far away South America, the railroads have heard of Hyatt Bearings and specified a large shipment of cars to be Hyatt equipped.

You don't have to purchase new cars in order to take advantage of Hyatt economies.

Install Hyatt Roller Bearing Replacement Boxes on your present equipment—the boxes that take the place of those gasoline-wasting plain bearings.

All you need is a wrench and a brace and bit.

And here's how it's done.

First, slip the wheel off the axle.

Remove the old-fashioned plain bearing box.

Then drill the two new bolt holes in the car sill.

Put the Roller Bearing Replacement Box in position and bolt securely in place.

That's all there is to it.

Could anything be simpler than that.

Write to the manufacturer listed below who can supply the boxes you require.

Drop him a post card now, while you think of it. There will be no obligations of any kind.

And the next time you are in the market for new equipment, don't forget to make your requisition read, "To be equipped with Hyatt Roller Bearings."

Hyatt Roller Bearing Company

NEWARK, NEW JERSEY

Replacement box equipped with Hyatt Roller Bearing ready for installation on motor car.

LIST OF MANUFACTURERS AND BOXES THEY CAN FURNISH YOU

Fairbanks-Morse Co.....Chicago, Ill.
Boxes for their hand and push cars

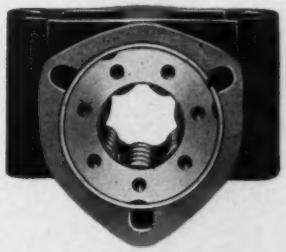
Kalamazoo Ry. Supply Co.....Kalamazoo, Mich.
Boxes for their hand or push cars

The Buda Company.....Chicago, Ill.
Boxes for their hand and push cars

Mudge & Company.....Chicago, Ill.
Boxes for their motor cars

Fairmont Gas Eng. and Ry. Motor Car Co.....
.....Fairmont, Minn.
Boxes for all Fairmont cars—and all other makes of hand and push cars

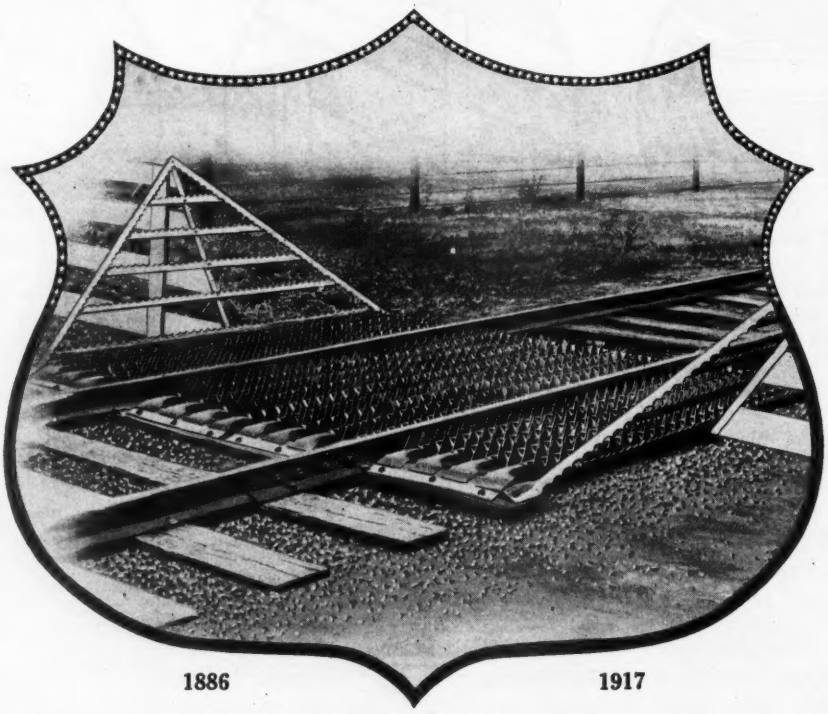
Northwestern Motor Co.....Eau Claire, Wis.
Boxes for extra gang cars only



Replacement box equipped with Hyatt Roller Bearing ready for installation on push or pump car.

1109

FOR SERVICE CARS



1886 1917

31 Years of Experience in Every 1917 National Steel Cattle Guard

The National Steel Cattle Guard is the *original* steel surface guard, and was invented by J. T. Hall in 1886. The newest model—the 1917 "NATIONAL"—is the highest achievement in surface guard construction. The principle of construction in this newest "NATIONAL" will interest you, as it contains many new features not found in any other guard, and because it offers so much to your road in the avoidance of stock claims.

The National No. 10 consists of four interchangeable sections, each 24 inches wide, constructed of the best open hearth steel, either No. 9 or No. 11 gauge. Each strip is of arched-channel construction—allowing no place for rain or salt water drippings to remain. Each strip has punched out teeth which stick up perpendicularly to the ties and run parallel with the rails—there is no place for dragging chains or brake beams to catch.

The National Steel Cattle Guard is so thoroughly constructed that we offer to send one on thirty days' trial. Test it! Put it in service alongside any other cattle guard. See how scientifically it is constructed. See how it turns all kinds of stock—SURELY. If you use Cattle Guards, you should know all about the new 1917 National. Write us for new descriptive literature, explaining and illustrating the construction of the National and telling why it is being used by leading railroads.

WRITE TODAY for CIRCULAR "A."

The National Surface Guard Company

Fisher Building **Chicago, Illinois**

Railway Maintenance Engineer

Volume 13 July, 1917 Number 7

(With which is incorporated the Engineering and Maintenance of Way Edition of the *Railway Age Gazette* and *Railway Engineering and Maintenance of Way.*)

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Protecting Slopes With Vegetation

The discussion appearing on another page of this issue relative to the protection of embankment and cut slopes by means of shrubbery, suggests a phase of roadway maintenance which has seen only a beginning on American railroads. The idea is fundamentally sound and has been put to use in various ways for many years. While its application in a scientific manner has been limited, the results secured thus far on railroads justify the conclusion that much good is to be gained by a more extended use of vegetation for this purpose. However, before proceeding with work of this kind it is well to consider its special character, since it is a matter entirely foreign to the usual maintenance of way activities. Consequently, any one inexperienced in the use of plantings is liable to expensive mistakes. The work really calls for the employment of a gardener or forester who is thoroughly versed in the habits and values of various species of plants and in their practical application and care.

Economies of Labor Saving Tools

In the past there has been a marked disposition on the part of most railroad men to go slow in the adoption of new devices or methods for doing work. This has been especially true in the maintenance of way department, probably because of the unskilled labor employed and the rapid changes in the personnel of the forces. With labor plentiful at the rates of pay that obtained before the recent increases, this course was, in a measure, justifiable. At present the importance of conserving labor and the necessity of securing the maximum production per man employed offer two good reasons in addition to the dollars and cents question for adopting a different course. In another column some interesting and instructive data are given showing the results obtained by the track forces of the New York Central with electric tie tampers, both in the electric zone, where power is secured from the third rail, and in the exterior zone, where power is supplied by generator sets. An analysis of the comparative figures in terms of men shows that one man with a tamper did the work of 1¾ men not so supplied. In the face of figures such as these, which are typical of the results which are being secured with many other types of labor-saving equipment, devices which will replace men deserve most careful consideration.

The Fall Conventions

Three of the maintenance of way associations are now seriously considering the advisability of proceeding with their conventions according to the original plans. If the conventions are held, the attendance, particularly of members from a distance, will be small, because of the difficulty of getting away from work under present conditions for the length of time necessary to attend the meetings. At the same time there is the greatest need for the exchange of ideas regarding materials and methods at those times when the problems are the most complicated. Acting on this idea, the Roadmasters' Association has already decided to hold its convention at Chicago, beginning on September 18, the date originally selected. The convention will, however, me cut down to two days and will be devoted entirely to business, all entertainment features being eliminated. The Master Painters' Association has

also tentatively decided to proceed with its convention at Cleveland on October 16 to 18. The Bridge and Building Association decided last year to hold its convention at St. Paul during the third week in October, but an informal letter ballot of the executive committee showed an almost unanimous sentiment that this convention should be held in Chicago, where it will be more readily accessible to a larger number of members, and that all entertainment should likewise be eliminated at this meeting. The spirit characterizing these associations as indicated by the desire to confine their attention strictly to business and to eliminate banquets and entertainments is to be commended. It shows a realization of the responsibilities of these associations by their officers and the spirit of loyalty to duty which pervades the membership. Under these conditions it would seem advisable for the associations to proceed with their conventions.

More Trouble for the Foreman

The Missouri legislature passed a law at its recent session prohibiting the railways from employing as a flagman for a section or extra gang any person who is unable to read, write and speak the English language plainly. This law, which went into effect on June 17, provides a penalty of from $25 to $100 for each violation. The predicament in which this law will place the foremen of many gangs will be similar to that of the Canadian foreman whose men had all left him and who found it necessary recently to renew a rail in the main track under conditions which required that he flag in both directions while doing this work. However, in spite of the fact that this law is typical of many conditions imposed upon the railways by public authorities without consideration of the handicaps they create, it emphasizes the importance of proper flagging to the safety of railway operation. The duties imposed upon a flagman involve more responsibillty than those of any other laborer in the gang, for from the very nature of his work a flagman is sent out to protect against danger. A supervisor should see that his foremen instruct their flagmen regarding their duties properly, for a lapse may readily result in an accident. Only a short time ago a street car was struck by a train in a large city and in the examination of the crossing watchman it was found that he was unable to read English or to understand the instructions which were given him in that language. Conditions such as these should be prevented and will be if the subject is given proper attention.

Records of Service Life

It will not be many years before the American railways will celebrate their first centennial. In consequence it is natural for railway men to look upon American roads as old established institutions, although there is little about the railroads of to-day that gives the appearance of great age. Owing to the fact that improvements in rolling stock, track, roadway and structures, progressed so rapidly during the first experimental years, original types and designs were superseded rapidly and repeatedly. Track construction was subject to many changes before the tee-rail, spiked to wooden cross ties, became the standard practice. The rapid growth of the railroads has also led to the replacement of many structures and facilities because they have become inadequate rather than because they were worn out. As a consequence, there is little about the original railroads other than a few stone arches that is still in service today, and it is not often that records of service life are to be had such as were obtained recently by the Illinois Central on cast iron pipes, an account of which is given elsewhere in this issue. Because of the bearing on the selection of new materials and the value in connection with the determination of depreciation for the Federal valuation, it is to be hoped that more records of the same or other materials in long use on railroads will be made available. The older eastern roads obviously offer the most fruitful field for research in this direction. Railway men who have information of this kind at hand will be of much assistance to others less fortunately situated by giving publicity to what they find.

Study the Market Conditions

The continuous, rapid increases in the prices of almost all materials, and particularly of steel, have created many unusual and surprising conditions with which railway men should familiarize themselves in order that they may order and dispose of materials to the best advantage. In most cases these conditions are resulting to the disadvantage of the railroads, although this is not universally true. One exception arises from the price of scrap. Rails unfit for further use are now selling at from $40 to $48 per ton, or about 50 per cent more than they cost new three years ago. One western road which was holding a considerable tonnage of second-hand rails of relatively heavy sections in stock has taken advantage of this condition to relay a number of branch lines and side tracks with those rails and to release and sell as scrap the light rails previously in these tracks. This second-hand rail had been held in stock at the old price of $25 per ton and is charged out to the work at this figure. As a result of the present conditions it has been found possible to improve these lines materially through the installation of the heavier rail, to supply the new fastenings required and to show a net profit of considerably over $1,000 per mile after deducting all labor and other charges directly allotted to this work. This has been made possible through the high prices now being received for scrap rail and fastenings, and shows the opportunity which now exists for the releasing and selling at high prices of those materials which it is desired to dispose of in the near future.

Labor Saving Devices

There has never been a time when there was such a demand for labor-saving devices of all kinds as the present. The shortage of men and the inefficiency of those employed are making necessary the use of appliances of all kinds which will permit the amount of work performed per man to be increased. This is leading to the development of many labor-saving devices. Some of them are being patented and placed on the market by manufacturers who are adopting the means at their disposal to call these devices to the attention of railway men. However, many devices of this character are being developed locally out on the line where their application is confined to the immediate vicinity of their origin, although in many instances these devices are of sufficient value to warrant wider use. We desire to describe these contrivances at the present time so that they can be brought to the attention of a large number of railway men at the season when they will be of greatest assistance. We, therefore, solicit the co-operation of our readers in sending us descriptions of any devices of this nature which are not generally known and which have not been published previously. These descriptions should include information concerning the character and nature of the device and the work it is performing. Photographs or sketches will frequently add to the clearness of the descriptions. We

desire to publish a number of descriptions of appliances of this character in the next issue. To be available for that number these descriptions must be received before July 15, although we will be glad to print others received after this date in later issues. We will pay for all descriptions of this character accepted and published at our regular space rates with a minimum of $3.

THE IMPORTANCE OF THE BOARDING CAMP

THE transitory character of much maintenance of way work makes it necessary for a railway to provide facilities for the feeding and housing of many of its men, particularly in its construction and floating gangs. In many industrial plants and to a more limited extent among the railways it is being realized that a man will not do his best work unless he is well fed and that an employee insufficiently and improperly nourished will be inefficient and dissatisfied. Therefore, since it is necessary to provide boarding and bunk camps for these men it is important that these camps be of such a character as to attract and hold men and to fit them for the work expected of them. Contractors have long realized the value of a good camp as a means of recruiting men, but the railways have been slow to recognize this fact and have commonly handled their camps in the manner that requires the least attention on the part of their officers.

As outlined on another page several different practices are in vogue for the feeding of maintenance of way laborers. In some instances, particularly with laborers of certain foreign nationalities, the men prefer to feed themselves. While in most cases this results in their being underfed and their efficiency lowered, little can be done to overcome this custom on their part, particularly at present when labor is scarce. It is with other classes of men that we are mainly interested in this discussion.

Where the railroad provides the food and lodging this is ordinarily done either by contract or directly by the road. The most common method of feeding laborers is to contract this work to an outside company specializing in this business. This plan possesses the advantage of transferring all of this detail from the railway to the contractor who has an organization experienced in this work. So far this is a distinct advantage. The difficulty lies in the fact that the interests of the railway and of the contractor are not the same. For the railway a boarding camp is simply incidental to the performance of its work. However, it is the primary business of the boarding contractor whose profit depends on the difference between the cost of the service and the rate the road allows him to charge the men. It is entirely natural, therefore, for the contractor to show a tendency to reduce the standard of the food in quality and quantity to the lowest which the men will endure..

The alternative is the operation of these camps by the railway itself. This practice has been adopted on only a few roads and in many instances with only certain gangs on these roads, although there is a strong sentiment among railway men at the present time that this is the proper step for a railway to take. The objection most commonly raised to this practice is that it adds another line of work to the already complicated and diversified range of railway activities and that, because of the red tape inherent in large organizations, these camps cannot be run by the railways as economically as by a contractor. It is also believed by some that the opportunity for irregularities constitutes a serious objection, although irregularities have also been found in contract camps involving both company and contractor employees. It must be admitted that these objections are real and that they must be considered. At the same time they constitute a serious indictment of railway methods. Furthermore, on those roads on which company camps have been operated it has been found that the objections are not as serious as commonly believed.

We do not desire to be understood as stating that all arrangements for the contracting of boarding privileges are bad, for this is not the fact. In many instances these camps are being operated more efficiently and more to the advantage of the railways by contractors than would be the case if the roads handled them themselves. On the other hand, it is entirely possible for many railways to operate their own camps more to their interests than they are now being operated by contractors. Camps can be operated efficiently by either system if they are given the proper supervision. The method most desirable for any particular road depends upon the local conditions, the character of the contractor and contract which can be secured, and the type of organization which a railway already has to place in charge of this work. There can be no disagreement with the statement that sufficient attention has not been given to this subject in the past and that the lack of attention to this subject, resulting in the exploiting of the men, has been an important factor in driving them to other industries. It is important that the officers of the maintenance of way department give the subject of the feeding of their employees more attention.

DO IT NOW

ANGLE bars worth 1.6 cents per lb. in normal times are now selling at 3.25 cents per lb. Track spikes worth 2 cents per lb. before the war are now selling for over 4 cents per lb. Track bolts, tie plates and other track materials have increased in cost in like proportion, while prices of bridge materials have increased still more. Consider the burden these increases has placed on the railroads of the country. In times of normal prices the maintenance of way department expends more than $600,000 each working day, or more than $180,000,000 per annum for the materials chargeable to operating expenses, and probably an equal amount for materials charged to additions and betterments. Considering the average increase in the price of materials to be only 50 per cent, which is less than the truth, this means that, providing the same quantities are purchased, in less than three years' time the operating expenses of the railroads have been increased $90,000,000 per year for the purchase of materials for this department alone. With the United States at war and in the market for the immense quantities of supplies necessary to complete the program of preparedness the demand for construction materials will constantly become greater. If not controlled by legislation or other means, this increased demand will force prices to still higher levels and the result to the railroads will be a still greater tax on their resources.

As, from present indications, little hope can be entertained for a speedy conclusion of the war, relief, if it is to be had, must come through conservation. A ready channel for this relief lies in the establishment of a reclamation department. Such departments on the roads which have already installed them are not only saving thousands of dollars to their lines in reducing the purchases of new materials by the extent of the usable material that is reclaimed but in addition they are earning dividends from the sale of scrap which was worth $12 to $15 a ton before the war and which now sells at $36 and $38 a ton. On most of the roads where such departments are not maintained their establishment has been considered and there is a more or less complete knowledge of how other roads handle the problem. Such roads ought to organize such departments now.

LETTERS TO THE EDITOR

HOW CAN WE KEEP SECTION FOREMEN?

ARIZONA.

TO THE EDITOR:

The article by F. W. Thomas in the April *Railway Maintenance Engineer* interested me greatly, particularly his remarks on the retaining of good foremen. I can agree with him thoroughly in his statements regarding compensation and living conditions.

I have followed track work all my life and have spent almost five years as a section foreman on a railroad in the Southwest, being located a considerable part of the time on a branch line. The laborers that were on this branch line section when I first took charge worked three or four days and quit. I hired three more in a few days and when they quit after working only three or four days I wondered what the trouble was. Upon inquiry of a neighboring section foreman I found that laborers at the mines nearby were receiving greater compensation for their labor and working only 8 hours per day, while the track men worked 10 hours. I thought this over and when I finally secured a new crew I worked them only 9 hours on the quiet and by this scheme succeeded in holding men. I remained on this section for over two years and had it in first-class shape when I was transferred to a section on the main line. I encountered the same trouble at this point, but could not adopt the 9-hour plan for I was too close to headquarters. However, I did manage to keep a crew, but it was made up of men that others wouldn't have. I had to make the best of it and after about a year and a half I was awarded the second prize, a $25 check.

In his article, Mr. Thomas referred particularly to compensation and living conditions. On the branch line section my wife and I were living in a small building which had once been used for a depot. It contained three rooms, a freight room, 17 ft. by 19 ft., and two smaller rooms, approximately 11 ft. by 11 ft. These small rooms were ceiled on the inside, but one was reserved for passengers, so we had to be content with the other one and the freight room. The outside of this building was boarded up with plank and battens, while the floor in the freight room consisted of two-inch plank with some of the cracks an inch wide. In the Southwest we have 60-mile winds that blow the dust through the cracks in this floor and the sides of the building. We could smell dust and taste dust and had to eat dust, for the food would be covered with it. I appealed to my superior officer to have the conditions remedied, but was unsuccessful. I finally bought some lumber and made such improvements as I could; put in a floor over the rough planks and built a little porch so my wife could sit in the fresh air. I also got the company to replace the rolling door in the old freight room with a regular house door, so we did not have to shove the large one back and forth all the time.

So much for the living conditions. Now as to the matter of compensation. When I went to the main line section, where I was responsible for the tracks in a large yard in addition to 8 miles of main line, they were working but one switch engine and it was not kept very busy at that. I had been there but a short time before the work increased so much that it was necessary to work two engines in the yard. This, of course, meant more work for me and I had to keep my work up with the force I had and without any increase in salary.

If a capable section foreman remains on a section very long he becomes acquainted with the weak spots, and defects in all forms. He knows just where to go during storms, he becomes a valuable man and takes an interest in his work and keeps his section in good condition. The section on the branch line has had 5 or 6 different foremen in the two years since I left it and it will take at least 4,000 ties to put it back in the shape it was in when I was transferred. Why were foremen dissatisfied here? On account of the compensation and living conditions I have described and the inability to hold men.

No doubt the section foremen's superiors blame him at times for not having any men, but *how can he hold men* when other industries pay twice the wages and work less hours? Living conditions are also a big item with the men. Many of the bunk houses provided for laborers in the Southwest are built out of old track ties with no floor. They are made by digging a small ditch in the ground and standing the ties on end. The roof is also of old ties covered with earth. When the rainy season comes on in July and August one can scarcely find a dry spot in some of these houses and the laborers fare pretty badly. In this territory the laborers cannot have gardens because of the dry climate and the green vegetables which the human system requires are not to be had.

These conditions must be changed before we can expect to hold men. Good, substantial houses ought to be furnished. It will cost something, no doubt, to supply water from tanks to irrigate gardens, but it will make the men much more contented and with good houses they will live generally healthier lives. Until the living conditions of the men are improved and until they are paid more nearly the current wage for good laborers, a foreman cannot be held responsible for failure to hold his gang.

ONE OF THEM.

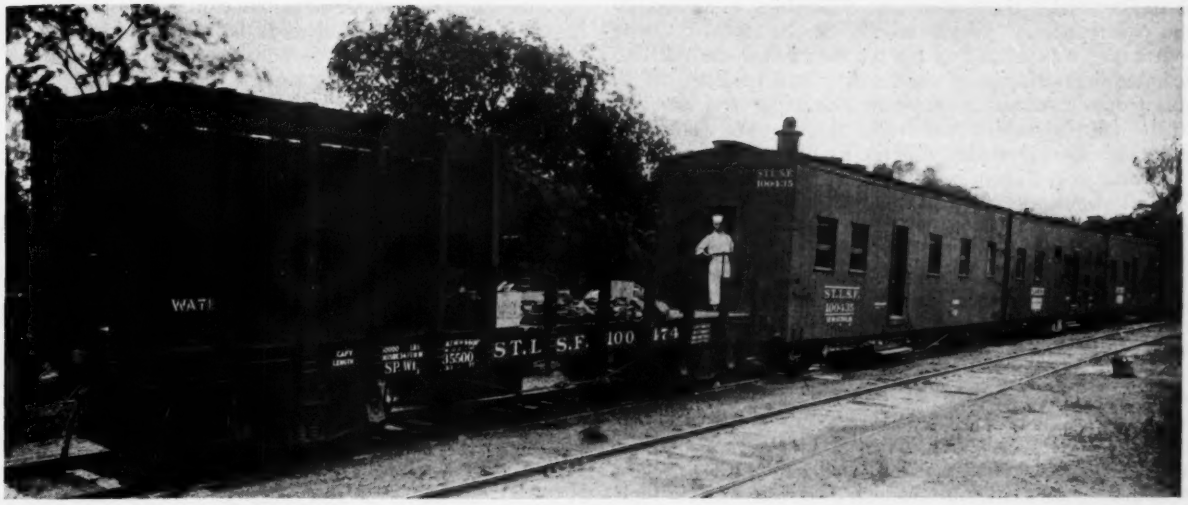
NEW BOOKS

Railway Estimates. By F. Lavis, consulting railway engineer, New York City. 6 in. by 9 in. 608 pages. Bound in cloth. Illustrated. Published by McGraw-Hill Book Company, 239 West 39th St., New York City. Price $5.

While this book is intended primarily as a reference for the man preparing estimates for new lines, it will be found of material assistance to the engineer in maintenance service, because of the large amount of information it contains regarding the cost of all the various items that go to make up a railroad. Following preliminary chapters on estimates in general and the cost of complete railroads, detailed discussion and cost data are given in turn on clearing and grubbing, earth work, tunnels, masonry, arches and culverts, bridges, tracks, miscellaneous items, buildings, shops and yards. Seventy-two pages are also devoted to the cost and general characteristics of motive power and cars, fuel economy, etc. Several appendices are included which contain a general specification for railway construction, an abstract of a railway appraisal, a general summary of timber treatment, some valuable statistics and some tables.

Proceedings of the American Wood Preservers' Association. 538 pages, 6 in. by 9 in., illustrated. Bound in cloth. Published by the American Wood Preservers' Association, F. J. Angier, secretary-treasurer, Mt. Royal Station, Baltimore, Md. Price, cloth, $3.50; paper, $2.50.

This constitutes a complete account of the Thirteenth Annual Convention of the American Wood Preservers' Association, which was held in New York on January 23 to 25, inclusive, 1917. As in previous editions this book also contains statistics on the quantities of wood treated and preservatives used in the United States during the preceding year.



A Boarding Camp on the Frisco

IMPROVING RAILROAD BOARDING CAMPS

Discussions of the Relative Merits of Various Schemes for Feeding Men and Suggestions for Improvement

THE recruiting and retaining of labor at present, as at all times, is more than a mere matter of the wage scale. The character of the work, the environment, the personality of the foremen, etc., are vital factors and where, as on railroad extra gangs, the man must be supplied with board and lodging, the character of the surroundings in which he must spend the idle hours of the 24 and the quality of the food are important conditions in determining the duration of his service. On the following pages appear several discussions of the relative merits of the various systems for the conduct of boarding camps and suggestions for their design, operation, supervision and maintenance along lines that will promote the health and contentment of the men and increase their physical and mental efficiency. There is also included an abstract of the Camp Sanitary Regulations of the Alaskan Engineering Commission, issued April 1, 1917, for use in the construction of the government railways in Alaska.

COMPANY CAMPS ARE BETTER

By Assistant Supervisor

In solving the difficulties arising from the present labor shortage, boarding camps and methods of feeding men have come to be one of the important questions in the maintenance of way department. The failure of local labor to supply trackmen has resulted in special efforts to offset local shortages by bringing men from other localities. After these men have been secured, it is the duty of the officers to whom they are assigned to retain them in the service of the company. The successful housing and feeding of these men has much to do with this.

It would be difficult to prove that one camp holds men and another fails because one is well operated and the other poorly operated. Good camps in themselves will not compete beyond a certain point against higher wages and other factors may have to do with the failure to retain the men at any particular point. It also must be admitted that men will sometimes accept very poor living quarters without much complaint. However, a clean, healthy and sanitary camp will justify its expense in the saving of time otherwise lost by the men on account of the sickness caused by unhealthful living conditions.

Any camp to be successful must be operated to meet the requirements of the railroad and also of the men. The company should require that proper economy be observed in expenditures, that the camps be clean, healthy and sanitary, and that the conditions about the camps are such that the men do not leave the service on account of living conditions. The men have a right to expect clean and sanitary equipment, good meals at a satisfactory cost, comfortable sleeping quarters and a reasonable opportunity for recreation.

There are many different plans that may be followed in preparing to house and feed these men. One way is to give them a place to sleep and a place to cook and let them do the rest. Some classes of foreign labor prefer this system, but the result is a dirty, unsanitary camp, and it is a common experience that these men will not buy enough nourishing food to sustain them properly. Another way is to let out the privilege for caring for the men to a boarding contractor, arrangement between the railroad and the contractor commonly specifying that the company furnish the buildings and equipment and the latter furnish meals at a fixed price per meal and also furnish supplies from a camp store. This plan is fundamentally in opposition to the best interests of the railroad. The company builds and equips the camps at considerable expense and these facilities are practically donated to some third party who uses them to make money for himself and for no other purpose. The men are the source of profit. There is little or no motive for this kind of camp to be operated so as to retain men. Meals will be no better than is necessary to keep complaints from becoming too loud, supplies will be sold to the men at prices out of all reason and it cannot be expected that the interests of the company or of the men can be considered as of equal importance to the business of making money. The control of the railroad over the cleanliness and sanitary conditions of the camps

is indirect with the consequent difficulties in enforcing the observance of proper standards.

Another way of caring for the men is for the railroad to take direct charge of the housing and feeding. With this plan the camps are operated to serve the interests of the railroad, which means that the men are well cared for at a fair price and without profit. The company's control over the camp is also direct and the proper standards of cleanliness, sanitation and conduct can be directly enforced. The needs of the men are more apparent to the officers and with a proper organization which takes advantage of all the facilities of the railroad to keep down expense, the accommodations furnished to the men should be more satisfactory and the expense to the company should be no greater than that incurred under the other plans.

The administration of a company-operated system of maintenance of way labor camps requires an organization fitted to furnish to the men at cost such necessities as food, clothes, tobacco and miscellaneous merchandise, to serve good, wholesole meals, to furnish and maintain clean and healthy sleeping quarters, to provide some recreation facilities and to enforce approved standards of personal habits, cleanliness, camp sanitation and discipline. The size of the organization will, of course, vary with the requirements, but in general this will mean the operation of one or more large central camps for floating gang laborers and several small camps located along the division for section laborers. The central camps will also be used in caring for a comparatively large number of men when they are received in one shipment and cannot be distributed immediately.

The system of purchasing food and other supplies will have a large effect on the costs. As far as possible purchases should be made through the purchasing department. This can be arranged conveniently by having a blanket order on reliable dealers conveniently located, purchases to be made as needed and the bills rendered at prices agreed upon by the purchasing department and the dealers. It is often possible to buy to advantage from nearby farmers and merchants and the necessary arrangements should be made to do this to the fullest extent. All rejected freight in the possession of the company should also be utilized to the fullest extent, as this results in mutual advantage to the camps and the freight department. There should also be truck gardens at each camp to be farmed by camp attendants. All supplies should be handled through a central storehouse, from which all camps may be supplied. A sufficient supply must be carried to meet such emergencies as delayed shipments and sudden increases in demand. To secure good meals requires good cooks and well equipped kitchens. The meals should be planned to suit the tastes of the men as far as possible, which can be accomplished by the selection of men whose tastes are more or less the same to live in one camp.

The maintenance of proper standards of camp sanitation and cleanliness is best secured by proper supervision of the camps. There should also be a representative of the medical department assigned to camp duty, who should give advice as to proper standards of sanitation and should also report to his superior any failures to observe his recommendations. This man should also give medical attention to such men as require it. On divisions where the camps may care for 200 men or more, it is good economy to fit up a small hospital in which the doctor can keep all cases of sickness under observation during treatment. This will tend to prevent epidemics and will also result in the minimum time lost to the company on account of sickness.

A company-operated system of camps is especially to be preferred under the present labor conditions. It is most economical when it is considered that the housing and feeding of trackmen is not a temporary expedient, since present conditions indicate that such measures will be necessary for a sufficient time to warrant the building up of the necessary organization and plant, and that the camp is operated to secure the best results for the railroad by good care of the men, by eliminating all profit and also because there is no more effective way to show men that their services are wanted.

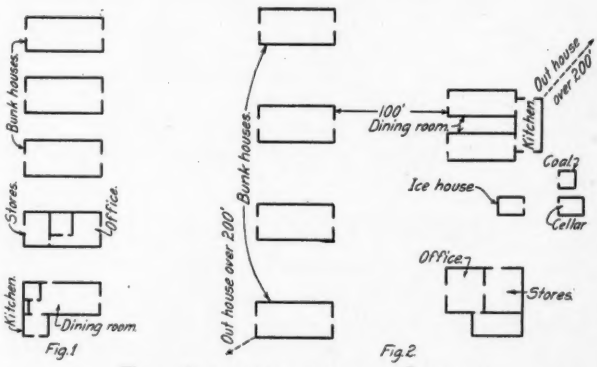
CAMP DESIGN AND OPERATION

By F. E. Weise

Chief Clerk, Engineering Department, Chicago, Milwaukee & St. Paul, Chicago, Ill.

In order to do effective work, and render efficient service, a man must be in good health, and the primary object of the camp should be to keep him physically and mentally fit for his work. Good, wholesome, properly cooked and well served food; comfortable, clean and well ventilated sleeping quarters; provisions made for bathing and recreation will accomplish this and secure the good will of the men. Good will brings about co-operation, and will reflect in the amount and quality of the work accomplished, even though it cannot be analyzed into dollars and cents. Discipline must be maintained and it can be done in a manner that will claim respect and win regard. Whether a camp is good, bad or indifferent has so large an effect on the working qualities of the men that it demands special consideration in organizing for constructive work. Men who are properly fed and housed and who receive considerate treatment will render more effective service, and perform a greater amount of work than men who are dissatisfied and discontented.

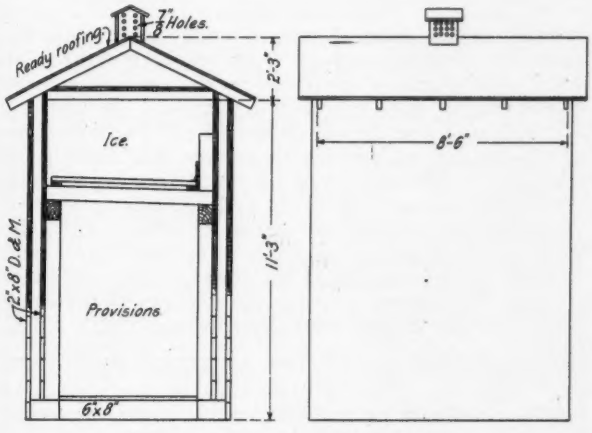
It is quite the common practice to engage a boarding contractor to conduct the camp, and this is usually a good arrangement, because with his experience and organization he relieves the railway officer of this responsibility and permits the latter to devote all his attention to his regular work. There are many cases, however, in which it is quite essential that the railway conduct its own camp, and it is the purpose of the writer to consider, in the main, a camp that is established for a considerable length of time. When a camp is conducted by the company, its entire supervision must be under the officer in charge of the work in order that there may be perfect harmony between the administration of the camp and the carrying on of the work.



TWO ARRANGEMENTS FOR CAMPS

Local conditions control in large measure the choice of location of the camp, which should be as near to the site of the work as possible in order to minimize the walking

distance. The camp buildings should be located on high ground whenever practicable so that the natural drainage is away from the buildings and insures rapid drying out after rains. The arrangement of the buildings, and the plan of the buildings themselves will depend somewhat on the location, the material that is available for their construction and the season of the year during which the camp is to be in use. If the camp is to be in operation during the winter as well as the summer, the buildings must be of a more substantial type that will with-



DESIGN FOR A SMALL ICE HOUSE

stand stormy weather and keep out the cold. A camp which is to be used only a few months in the summer time may be of a very temporary form of construction.

All camp buildings should be built high enough above the ground to enable a man to clean up underneath. The space under the building is easily inspected and no old clothes or rubbish should be allowed to accumulate. In the autumn this space should be enclosed as a protection against cold. The buildings should be equipped with stoves or some other heating apparatus, not only for warmth of the occupants, but to dry them out in damp weather.

THE BUILDINGS

The office building should be of similar construction to the other camp buildings, and large enough to provide for an office for the transaction of business and do the necessary clerical work and drafting, and a storeroom for the camp supplies and the commissary. Sleeping quarters for the engineering and office force should also be provided either in the same building, or a lean-to-communicating with it. Figs. 1 and 2 show two arrangements that have been used satisfactorily, and also suggest the location of the various camp buildings. In both cases it is to be noted that the office building is so located that the kitchen and dining-room are easily supervised and thus promiscuous feeding can be guarded against.

For the average camp, the dining-room and kitchen should be in one building and separated by a partition. In the dining-room end sufficient tables should be provided so that the entire force may be served at one time. When the camp is not too large, the building should be long and narrow, under which arrangement the dining-room is at one end and the kitchen at the other, with entrances at each end and a communicating door between the kitching and dining-room. The dining-room should be wide enough to provide for two long tables at the sides with an ample aisle between, which will permit waiters to pass back and forth freely. This form of building can be loaded on a flat car and transported from one location to another. For larger camps it may be better to construct the building in the shape of a "T," in which the dining-room is one large room and the kitchen an annex at the center of one side. Another good plan consists of three adjoining buildings placed in the form of a letter "U," and provides for two separate dining-rooms with a common kitchen. This plan is desirable where the force is apt to fluctuate. When the force is small, one dining-room may be closed, and as the work nears completion, one building may be removed without interfering with the camp routine.

Whatever the arrangement decided upon, provide liberally for windows, in order that in cold weather the dining-room will be well lighted and in hot weather the windows can be thrown open. Nothing is more conducive to cleanliness than plenty of light, and it is the common experience that rubbish will accumulate in dark places. Screens for windows and doors are an absolute necessity, and a constant effort must be made to eliminate flies, ants, roaches and other pests. Frequent scrubbings with a liberal use of hot water and soap will be of great help, and a good rule is to scrub the kitchen every day and the dining-room twice a week. The dining-room and kitchen floor should be swept after every meal.

It is usual to provide long tables about 30 in. wide with long benches at each side. Sometimes smaller tables are provided seating four to six men each, but it is found that this plan requires more waiters and that the men cannot be served as quickly. It will be found more satisfactory to the men to eat at the same table with those they work with and, therefore, each man is assigned to a definite place by the clerk in charge of the camp. The tables should be strongly built and the top at least made of surfaced lumber in order that it may be kept clean.

KITCHEN UTENSILS, DISHES, ETC.

Considerable thought should be given to the selection of this part of the outfit. The kitchen utensils should be chosen for their utility. They are in constant use and must be strong and durable. Without being unnecessarily extravagant, select ware that can most easily be kept clean. A little expenditure on quality is a good investment here, because the cook and his helpers will take pride in keeping good equipment in good condition.

The dishes in the dining-room should be of a good grade of heavy crockery. Tin or enamaled dishes have in the past found favor with some because of the overrated quality of unbreakableness, but this is more than offset by their disadvantages. Tin dishes are hard to keep clean, or at any rate clean looking. Steel knives rubbing on tin or enamel produce a disagreeable and irritating noise, and also are apt to chip off the enamel. They allow the food to get cold too quickly.

Crockery can not only be kept clean more easily, but it adds more to the meal than at first thought seems possible. An office man may find it a little difficult to appreciate this. Should he go on a hunting or fishing trip for a few days, he rather enjoys having his meals served in tin dishes. As a matter of fact, it is the novelty of the change that he enjoys. Unaccustomed activities, together with unlimited fresh air, make him so ravenously hungry that he takes no account of the service. How long would the novelty last? The man in the construction camp is in a different position. Camp life is his daily existence, and there is a natural craving for better things. The same food will be twice as appetizing if served on crockery than if served on tin or enamel, and it makes the man feel that he is considered somebody.

Actual experience shows that the breakage of crockery is not large and that its expense is not much greater than other ware. The following list will serve as a guide in preparing for the first requirements of a camp of about 50 men:

KITCHEN UTENSILS

1 Range for coal, 28 in. by 54 in.
2 Griddle irons, 16 in. by 24 in.
6 Galvanized pails, 12-qt.
2 Washboards.
2 Stock pot, 10-gal.
6 Sauce pans, 6½-qt.
4 Dish pans, 30-qt.
4 Frying pans, 12-in.
1 Skimmer.
2 Flesh forks.
2 Funnels.
12 Pie tins, 9-in.
12 Coffee pots.
1 Flour scoop.
1 Pot chain.
1 Nutmeg grater.
2 Rolling pins.
1 Pastry brush.
3 Can openers.
1 Coffee strainer.
2 Butcher knives.
6 Paring knives.
1 Cleaver.
1 Ice pick.
6 Scrub brushes.
12 Dish towels.
12 Waiter's aprons.
1 Alarm clock.
2 Roasting pans, 32 in. by 22 in.
2 Cake turners.
2 Galvanized tubs.
1 Stock pot, 5-gal.
1 Boiler, 20-in.
6 Colanders.
6 Pudding pans.
4 Soup ladles.
2 Basting spoons, 18 in.
6 Water dippers, 1-qt.
1 Measure, 1-gal.
6 Bread pans, 11 in. by 7 in.
2 Potato mashers.
1 Flour shaker.
1 Grater.
1 Egg whip.
1 Cutting board, 13 in. by 24 in.
1 Meat chopper.
12 Tin cups.
1 Scale with scoop.
2 Bread knives.
1 Butcher's steel.
1 Meat saw.
1 Ice tongs.
6 Wash basins.
24 Roller towels.
2 Mirrors, 9 in. by 12 in.

DINING-ROOM

Crockery

60 Coffee cups.
60 Dinner plates.
6 Platters, 11½ in.
60 Soup bowls.
12 Butter dishes.
6 Water pitchers.
60 Saucers.
6 Platters, 13-in.
36 Vegetable dishes.
12 Sugar bowls.
6 Milk pitchers.
60 Sauce dishes.

Glassware

6 Vinegar cruets.
6 Salt shakers.
60 Water tumblers.
6 Syrup jugs.
6 Pepper shakers.

Cutlery

60 Knives.
60 Tablespoons.
60 Forks.
60 Teaspoons.

KITCHEN

Whether the kitchen is part of the same building or not, it should communicate directly with the dining-room, but be separated from it by a partition and a screen door. There should be a door opposite the dining-room through which supplies and fuel are received and refuse taken out. It should also be provided with plenty of windows and a ventilator in order that the heat and odors from the range may be kept from the dining-room. In the summer time the windows and doors should be screened. The kitchen should be equipped with a range, serving table, sink for washing dishes, cupboard, shelving and a pantry. The pantry is used to store such supplies as are required from day to day, but not in any large quantity. The large stock of supplies should at all times be kept in the store room that connects with the office, and the cook will draw therefrom what is needed from day to day. The cook and his helpers should have sleeping quarters either in the main building or adjoining the dining-room, but if in the same building they should be completely partitioned off from the dining-room, and the door be kept closed. A refrigerator should be provided, and it will be best to have this a separate building located conveniently to the kitchen. This can easily be constructed from matched lumber.

The force required for a camp of about 150 men will consist of a cook, three flunkies and a commissary clerk. Larger camps will require additional help in proportion. Much depends upon the cook in the conduct of the camp, not only in providing satisfactory meals, but also in keeping the expenses within proper limits. In small camps and where the cook is found to be thoroughly reliable, it may be found practical to furnish him supplies from day to day without keeping a daily record, but in the larger camps it is necessary to require him to make requisitions for such supplies as he needs to equip the pantry from day to day. These orders are filled by the commissary clerk, who enters the prices opposite each item, thereby keeping in touch with the daily expense of the camp. The commissary clerk should keep records of all supplies received from day to day, of all supplies turned over to the cook each day, and on the morning of the first day of the month should make an inventory of all supplies on hand. At the time the inventory is taken, he should make up a statement showing the cost of the supplies used for meals, and all other expense in connection with the camp, such as oil, fuel, wages, etc. A record of the number of meals served each day should be kept, which is assembled at the end of the month into a complete statement showing the expense of the camp for the current month, the number of meals served, and

MONTHLY INVENTORY OF SUPPLIES DATE----------19--.

CAMP NO.-------LOCATION----------

Total number of meals served----------Assistant Engineer.

	Amount on hand last inventory		Received during month		Consumed during month		Amount on hand this date	
	Amount	Cost	Amount	Cost	Amount	Cost	Amount	Cost
Allspice								
Apples (Canned)								
" (Evap.)								
Apricots								
Bacon								
Baking Powder								
" Soda								
Tomatoes								
Turnips								
Vinegar								
Yeast								
TOTALS								

FORM FOR CAMP INVENTORY

the average cost per meal, and also the same information for the entire period since the opening of the camp. The forms shown are all very simple and need no further elaboration.

The store room and refrigerator should at all times be stocked with a liberal supply of food, but well kept under control for fear of encouraging extravagance or waste on the part of the cook and his helpers. Arrangements should be made to secure fresh meats at stated intervals and fresh vegetables, butter, eggs and milk can usually be provided for locally. Local purchases must be paid for in cash from day to day and a working fund required to take care of them. The cook will perhaps prefer to use canned goods almost entirely because of the ease with which they can be prepared for the table, but it is more economical and better for the men to use fresh vegetables when in season.

The bill of fare will need quite a little study and consideration. While it is planned to give each man a sufficient amount at each meal of good, plain and substantial food, properly cooked, care should be taken not to serve the same thing every day, but to provide the variety necessary to everyone. Many of the complaints made of the food may be traced directly to lack of variety and not the quality of the food or the way in which it was pre-

pared. It will be found that most men crave pies, puddings and pastry, and it will be found necessary to use discretion in the matter. A little extra attention to these matters on Sunday and holidays will go a long way toward keeping up a good feeling in the camp.

Meals should be served at regular hours and promptly, and it should be the aim at all times to give the best possible service that conditions will permit. Special attention should at all times be given to cleanliness. Waiters must be instructed to put on clean aprons before each

CAMP NO.-------LOCATION----------

Employes Receipt No.-----Date----------
Received from Commissary Clerk the following articles the cost of which is to be deducted from my wages at the next pay day

No.	Description	Rate	Amount

Signature.

FORM FOR COMMISSARY RECEIPT

meal. After the meal is finished, the dishes should be thoroughly washed with hot water and soap. Many of the minor ailments of men in a camp may be traced directly to improper washing of dishes. The floors of the dining-room and kitchen must be swept after each meal. The tables should be scrubbed with soap and hot water after each meal, the dining-room twice each week and the kitchen floor every day. After the dishes are washed they are usually put in place on the tables ready for the next meal, and should be covered with suitable cloths. Dish cloths and towels should be thoroughly washed in boiling water after each meal and then dried.

Garbage should not be allowed to accumulate. A barrel having a tight fitting cover should be provided, in which all of the garbage can be collected. Once a day this barrel should be taken to a considerable distance from the camp and the contents buried, or better still, burned. A garbage incinerator can be constructed easily and cheaply, and is by far the more desirable plan.

If a well of good drinking water can be secured, it will be found a wonderful assets to the camp. The well should be located not nearer than 100 ft. from any camp building, and preferably more, and if possible on a rise of ground. It should be curbed at least one foot above the ground level, and the surrounding space filled in with earth to slope away from the well. It should be properly covered and protected so that nothing may be thrown into it that will pollute the water. It goes without saying that outhouses and the disposal of garbage should be kept at a safe distance, not less than 200 feet away.

Sometimes a good spring is located in the near vicinity and the water can be piped to the camp. Should the camp be so located that water from a river or lake must be used, the problem becomes more serious, and extraordinary precautions must be taken to keep the water from being polluted. Water taken from a lake or river must usually be boiled before it is used for drinking.

COMMISSARY STORE

It is sometimes necessary that a commissary store be run in connection with the camp, especially when the camp is located at some distance from a town. This store should be in charge of the commissary clerk, and should carry in stock such goods as are most frequently called for and used by the men, such as overalls, shirts, socks, blankets, heavy shoes, overshoes and standard brands of tobacco. This list may be extended as warranted, but in no case should it include liquor of any kind.

When a camp and commissary store are run by the railway, it is not for the purpose of making a profit, but care should be used to see that it is not run at a loss. For that reason careful accounting is necessary and precautions should be taken to prevent petty thievery or grafting. A commissary should not be run in competition with a local store. In the first place, the conduct of a commissary is an added care that ought to be avoided if possible, and in the second place it is the desire of the railroad to encourage business along its lines. The commissary store should be run on a strictly cash basis.

All accounting in connection with the camp and the commissary store should be as simple as possible, but separate books should be kept for each in order that any profit and loss may be allocated to the right source. Two books for each will suffice, one a combined day book and journal in which all transactions are recorded, and which at the end of the month will show the total debits and credits, and the other a cash book which records the cash transactions only, and should be balanced up each night with the amount of cash on hand. In the day book journal for the camp, the debit entries consist of kitchen utensils and supplies, fuel, oil, food supplies, and wages of camp employes. This account begins each month with the inventory of supplies on hand. On the credit side

CHICAGO,MILWAUKEE & ST. PAUL RAILWAY COMPANY
Engineering Department

REPORT OF CAMP

At----------for month ending----------19---

Date camp was opened ----------191---	Previous Report	Current Month	Total to Date
Cost of Kitchen & Dining Room Utensils & Equipment			
Cost of Camp Labor in Kitchen, Dining Room & Bunk Houses			
Provisions and Supplies			
Total			
Number of free meals furnished			
Number of paid meals furnished			
Average cost per paid meal			
Receipts - Cash for meals			
Board Deductions			
Provisions sold			
Total Receipts			

Correct:

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Commissary Clerk. Assistant Engineer.

FORM FOR MONTHLY STATEMENT

will be entered the board of the men, receipts for supplies sold and the inventory of supplies in the store room at the end of the month. The difference between the totals of the debit and credit entries will show whether the camp is being run at a profit or a loss.

PRICE OF BOARD

It is quite customary in determining the price to be charged for board and lodging to charge the employee what he would have to pay ordinarily in nearby towns and then furnish as good board as possible with a view to having the camp pay for itself. The cost of meals

furnished to those employees needed to operate the camp are considered a part of the camp expense. Should there be any employees on the work whose expenses are paid by the railway company, the cost of the meals should be charged to the work and the camp given credit. At the beginning of the work the force may be comparatively small, and at the close of the work it will gradually diminish, making two periods during which the camp will not pay for itself. It should therefore be planned that when the force is at its maximum, the camp should make some profit in order that when the work is closed the accounts will about balance. In order to do this the affairs of the camp will have to be planned and watched carefully.

It will be found more satisfactory to use a rate per week than a rate per meal. In the former case the matter of lost meals need not be watched, and there are apt to be fewer misunderstandings. It will also insure a more regular attendance at the camp meals on Sundays and holidays. If a rate per meal is decided upon, some form of meal ticket will have to be provided, which is punched as the men enter the dining room. As a general experience a camp of 25 men or less will not pay expenses; a camp of from 50 to 75 men can be made to come out about even, and a larger camp will show a slight profit. This bears out the previous statement.

It will be seen from the above that there are many factors entering into the management and operation of a camp. The physical features are so largely controlled by items such as, the nature of the work to be done, the location of the work and the camp, how long the job will last, the natural resources of the surrounding country as to food supply, the proximity of a town or city, and so forth, that no very definite rules may be laid down. It will pay in all cases to furnish the best that circumstances will permit without being extravagant or wasteful.

MEALS MUST BE GOOD

P. H. HAMILTON

Safety Inspector, St. Louis-San Francisco, Springfield, Mo.

In spite of the fact that there is a serious shortage of labor for track work throughout the country, the St. Louis-San Francisco has been able to hold extra gang

KITCHEN CAR

laborers, and at the present time gangs are about 70 per cent filled. This is undoubtedly due in no small part to the manner of feeding and housing the men.

About ten years ago the road entered into a contract with a supply company at Kansas City to hire, board and supply all extra gang laborers on the entire system, and this agreement is still in effect. Previous to that time it was customary for the railway to secure laborers from employment agencies which made a livelihood from an employment fee from each laborer shipped out. This plan has been wholly discontinued, and the boarding company operates free employment offices in the various labor markets on the Frisco lines, and the men are sent to work without cost either to themselves or the railroad.

FOREMAN'S BUNK AND OFFICE CAR

This cost is borne by the boarding company as a part of the service in connection with boarding and housing the men.

On account of the fact that labor was plentiful in times past, all railroads housed their extra gangs similarly, and little attention was given to see that the men were properly fed or cared for. At the direction of E. D. Levy, vice-president and general manager of the Frisco, more attention has been paid to the handling of extra gang laborers, and at the present time boarding camps are being operated on an efficient system, with the result that men are more easily secured, stay longer and do better work than under the old plan.

Standard outfits have been adopted and the old, run-down, unsanitary cars have been dismantled and destroyed. The men are not crowded in their quarters. Wooden bunks have been discontinued and all outfits are equipped with metal bunks.

Although the prices of foodstuffs have practically doubled in the past two years, the present rate for board is fully 40 per cent less than the prevailing local rates for the same class of service. The men are provided with three hot meals per day, served in dining cars, with no restriction as to quantity. The increase in cost of provisions allows little profits, as it is the intention to keep the men satisfied if possible. No matter how good an outfit, there will always be some contention among the men, but it is possible to satisfy the majority. Track labor is transient, and although the men come and go, they always have a kindly feeling for the camp and the foreman where conditions were comfortable, and the men well fed. In the hobo "jungles" you can always hear tales of the various camps, good and bad, and the "stomach robbers" are generally known throughout the

country. When hiring men, conditions should not be misrepresented, as a laborer usually forms his opinion during his first half hour in camp, and during that time he decides whether or not he will stay.

The cook is very important in holding men, and means must be taken to hold a good one. An efficient one wishes sanitary quarters, he needs a good kitchen, and above all a good stove with plenty of large-size containers and utensils. If the cook isn't satisfied you will not be able to please the men. While the cook works on the efficiency plan with a bonus for low meal costs he should be able to serve good, wholesome meals. He should be able to change the manner of serving victuals from time to time without waste. The diet should be changed as often as possible from a business standpoint. There are places where vegetables, and sometimes fish, can be bought on the local market, which will reduce the meal cost and please the men. Little surprises, no matter what, are appreciated, and remembered. If a man going into supper can anticipate something different, it pleases him, but in most camps a laborer can tell you on Wednesday what he will have to eat for supper on Friday, for it will be practically the same meal that he is served for supper seven days each week. Meals served in extra gang camps are very plain, and a first-class cook will take pride in changing the manner of serving. Too much "sameness" spoils an appetite, and a man with no appetite makes a very poor laborer. The cook or commissary clerk should be allowed a cash account from time to time in order that they may purchase vegetables and other supplies in small quantities on the local market to change the monotony in the bill of fare. It is sometimes possible to have a fish fry or a vegetable dinner as cheap or even somewhat cheaper than the regular bill of fare.

ONE OF THE DINING CARS

A cook can keep his meal costs down by having few "lost meals," and the nature of the work, the personality of the foreman and of the commissary clerk, and the general condition of the camp have a tendency to make or to stop "lost means." A number of commissary clerks are dilatory and grafting; and for this reason the foreman should know something of the duties and limitations of the commissary clerk, so that he may know whether the men are getting what they are paying for. I have known clerks who were allowed cash accounts to charge radishes, lettuce, onions, etc., to the table, and a fresh vegetable of any kind was never seen in camp.

Boarding companies operate with the expectation of a certain percentage of lost meals, and all under this percentage is profit. Lost meals result from men who skip out with no intention of going to work, or from men who get a bad impression of the camp when they land there, get supper and breakfast and then "blow," and the boarding company loses two meals.

Wages have been raised from time to time, and it has also been necessary to raise the rate for board, until at the present time the board rate looks astounding to the average hobo. In fact, the rate for board has more influence on him than the rate of wage. In order to furnish good grub and to get the confidence of the men a good plan is to let the board remain low, and the railroad company pay the boarding company a bonus each week for each man boarded. In this way the laborer realizes that he is receiving good board at a moderate rate, and he appreciates it.

Good water is necessary, and it may be expedient to ship water a hundred miles. I have known of large numbers of men to leave an outfit on account of the drinking water; where if the foreman had handled the matter properly he would have been able to furnish good water for his men.

FEEDING FOREIGNERS A PROBLEM

BY F. WEST

The subject of feeding men is necessarily a broad one, for the method of feeding a gang of native laborers would not do with a Greek, Italian or other foreign gang. In the maintenance of way department on the average western road there is only one place where a permanent camp can be constructed to advantage and this at a gravel pit of such size that the supply will last for years. The usual practice is to have an outfit of bunk cars provided for pit and shovel crews and the engine and train crews who do the spotting. The commissary is operated by a company which contracts to feed the men at a fixed price per week. The outfit consists of a cook car, one or two dining cars and a supply car. The price paid by men for board varies yearly, but is always high enough to make the commissary pay a large profit for food and service given.

The establishment of a permanent camp in a gravel pit where the pit is worked yearly and the supply of gravel large, would be a paying proposition. This should consist of three or four bunk houses so that each class of men would have a separate bunk house. The houses should be one story high with cement floors, and plenty of windows, and should be large enough so that each man will have 24 sq. ft. of floor space. The commissary house should be divided into three rooms, a kitchen, a dining-room and a store room. One thing that should not be overlooked is the screening and lighting of the buildings and the furnishing of good bunks with springs in the sleeping quarters.

Such a layout will more than pay for itself through the improvement in the class of labor it will attract and keep. The feeding of the men should be handled by the employing company and only actual cost of food and its preparation should be charged the men, as the main problem at present is to get and retain efficient labor.

The floating boarding camp should consist of clean, well kept cars with steel bunks. The cars must be well

lighted and the doors and windows screened. The meals served must be of good quality and well served and the men charged only what it costs to buy and serve the food. To do this, the employing company should hire a good cook, furnishing him supplies in reason and prorate the cost of each laborer.

The feeding of the foreign gang is a problem, and no satisfactory system has as yet been tried. The car unit system in vogue in most gangs at present is more satisfactory than the gang cook and gang dining car, as the men are very suspicious and assume that anyone who buys for the whole gang does so for a profit to himself, and this is usually the case. In any gang following the latter plan there is usually a quarrel on pay day when the men pay their portion of the cost for the month.

It is hard to say what the results would be if the men were boarded by the railroad at the actual cost of food, cooking and serving. The cooking would have to be done by a cook of the same nationality as the gang, as the men want food to which they are accustomed. For instance, some nationalities will not eat bread other than that baked in large clay or cement ovens. Small box cars can be used if properly overhauled—ceiled inside, well floored, the sides and ceilings painted, and furnished with four single double-deck steel bunks, placing eight men in each car. Each car should be furnished with a combination heating and cook stove, a table and a couple of benches. The efficiency of the men will be greatly increased by good housing, and the "season-bonus" system in addition would be a holding card. I have had with me for the past five years one gang of Greeks and one of Italians who are now efficient men, and grow more efficient yearly as they know just what is expected of them, and are acquainted with all work and the standards of the road.

ALASKAN RAILWAY REGULATIONS

Construction camps shall be located on the best site obtainable, from the standpoint of water supply, drainage and sewage disposal, consistent with convenience to work.

WATER SUPPLY

When the water supply is to be taken from a stream the point of intake shall be above the camp site, and a sanitary survey of such stream above such intake shall be made to ascertain if there be any source of pollution. If there be a source of pollution of such stream such fact, with all available data, must be reported at once to the sanitary officer of the division, by the district engineer, and a well dug to conform to the following regulations:

No well may be located less than 100 ft. from any cesspool, toilet or stable, and must not be on ground receiving drainage from any such place.

All wells supplied with pumps must be curbed up to a point one foot above the surface of the ground and tightly covered.

All wells supplied with ropes and buckets must be curbed up to a point 30 in. above the surface of the ground, and fitted with a good cover.

All wells must be backfilled with earth or gravel around the curb to a depth of one foot at the curb, sloping to the surface of the ground six feet away from such curb, in order that surface water cannot get into the well.

COOK TENT

The cook tent must be located on sloping ground or that which can be drained easily. The floor of such a cook tent shall be of dressed lumber, preferably tongue and grooved flooring, water-tight; if not water-tight, such floor shall be raised 12 in. above the surface of the ground so as to permit free circulation of air underneath; must be scrubbed daily and kept in a clean and sanitary condition at all times.

All fixtures and utensils must be so arranged as to permit of free access for cleaning purposes.

All work tables and other utensils must be kept free from accumulations, such as flour, dough, grease, etc.

All canned goods, excepting milk, must be emptied as soon as opened, and not permitted to stand in original tin cans.

All garbage should be burned in the cook stove as completely as possible.

Suitable fly-proof and water-tight cans must be provided into which all scraps, empty cans, and waste material shall be placed, which cans shall be removed to a point remote from camp, and the contents either buried or burned. Such removal should be made every second day from May to September inclusive, and once a week during other months. Throwing such garbage in streams will not be permitted.

A well ventilated, properly screened fly-proof meat house shall be provided adjacent to the cook tent, for storing small quantities of fresh meat. On receipt of any fresh meat in bad condition, from any cause whatever, such fact, with full data, must be reported at once to the district engineer, who will report same to the sanitary officer at Anchorage.

MESS OR DINING TENT

The mess or dining tent shall be separated from the cook tent or kitchen by a door or fly that may be closed.

Tables shall be provided with cotton fly-screen, which shall be kept spread over the tables except when they are being used to serve meals. Mess tents shall be kept as free from flies as is possible, and suitable measures must be taken to secure such results.

REDUCED PASSENGER SERVICE

MANY railroads have announced plans to reduce passenger service in accordance with the recommendations of the Railroads' War Board. The object of this curtailment of service was recently expressed by George D. Dixon, vice-president of the Pennsylvania Railroad, as follows:

"In brief, we are attempting two things: First, to increase immediately the movement of such freight as food stuffs and other necessaries of life; second, to clear our lines for the prompt handling of government supplies and troops, which must shortly be transported on a large scale."

He stated further that the railroads would endeavor to accomplish this in the following ways:

"1. By consolidating passenger trains wherever practicable, thus making one train unit serve the purpose of two or more;

2. By the entire elimination, in some cases, of trains on which the patronage is very small;

3. By reducing the number of restaurant cars, and in no case operating more than one restaurant car on a train;

4. By reducing the number of parlor and sleeping cars, and by decreasing, or possibly discontinuing, the use of club and observation cars.

It is expected through these means to cut down the movement of passenger trains, on the Pennsylvania Lines East of Pittsburgh, by a total of about 6,000 train-miles per day."

The Boston & Maine has proposed the elimination of 400 trains on its summer schedules and the New Haven

has suggested a reduction of nearly 200, and will eliminate a large number of excursion trains. The Southern is arranging extensive reductions and the Philadelphia & Reading has already taken off 12 trains in suburban service to Philadelphia. Two Philadelphia-Trenton trains will be eliminated and two trains to Buffalo will be consolidated in one.

Traffic officers of railways running between Chicago and St. Paul, Chicago and Omaha, Chicago and St. Louis, and Chicago and Kansas City, have held conferences recently at St. Paul, Minn., St. Louis, Mo., and Chicago to consider the feasibility of reducing train service between the points mentioned and curtailing the club car and similar service.

Service Records of Cast Iron Pipe

SOME service records on cast iron pipe used in railway water supply lines were recently developed which will be of value to those concerned with water service installations. These data should also afford an opportunity for interesting comparisons with the basis used by the Federal valuation forces in estimating the depreciation on this material. The long life of cast iron pipe is a matter of rather general knowledge. There are records of pipe in use in Europe for over 200 years. In this country, and particularly on railroads, such long time service records are not to be had because of the limited time that these pipes have been in use. In the early years of American railroads, water service requirements were usually fulfilled with pipes of less than three-inch diameter and the use of cast iron pipe in consequence was limited to locations where three-inch or larger pipe were used. The records which follow are secured from the few examples of cast iron pipe lines over 50 years old available for investigation.

Several instances of old installations of cast iron pipe were recently made the subject of some study on the Illinois Central with the result that the life of several of these lines has been accurately traced down to the present time. The most interesting of these is a pipe line laid at Centralia, Ill., in 1855. This was a line of four-inch cast iron pipe approximately 10,000 ft. long. After 12 years of service in 1867, the pipe line became inadequate for the water consumption and upon examination it was found to be heavily encrusted. Efforts were made to improve its capacity by cleaning it and relaying a part of it with clean out boxes at intervals of 100 ft. This provided only a temporary relief and the following year about 5,000 ft. of the line was taken up and relaid with eight-inch pipe, which is still in service after being in the ground 49 years. The four-inch pipe relieved at Centralia was relaid in 1868 or 1869 at Ramsey, Ill., where it remained in service until 1903, when it again became too small for the demand and was replaced by six-inch pipe. Since that time the old four-inch pipe has been used at various places, principally as drains. A part of it is now in storage at Burnside, Ill., where the photographs shown were recently taken.

As seen from the illustrations, this pipe has a bell that differs in several details from the standard designs of the present time. Another interesting detail is the presence of two reinforcing rings or enlargements in the thickness of the pipe at the third points of the length. These can be seen in the illustration showing the full length of the pipe. The broken end of the pipe discloses the inequality of the thickness, a characteristic of early cast iron pipe resulting from the practice of casting the pipe with the mold in a horizontal position. Measurements taken indicated an average thickness of about $\frac{3}{8}$ in. As a means of getting some idea of the loss of section occurring during the 62 years of service, the dimensions of this pipe were compared with records of early designs of cast iron pipe and the conclusion was reached that it originally conformed to a design recorded in an early issue of the Journal of the Franklin Institute, having a length of 9 ft., diameter of 4 in., thickness of shell of $\frac{7}{16}$ in., and depth of hub of 4 in.

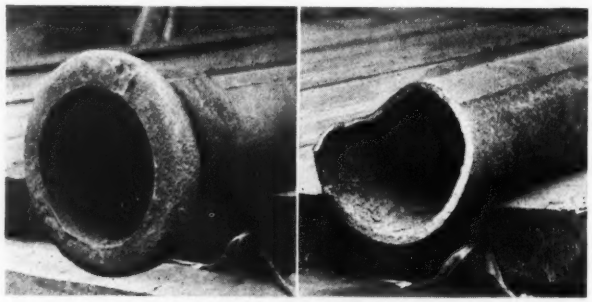
Another installation of which authentic records are available is one of 7,500 ft. of four-inch cast iron pipe at Little Wabash river, laid in 1857. This remained in service until July, 1893, when it was replaced by larger pipe. The old pipe was stored at Centralia until 1894 or 1895, when portions of it were relaid at that place and at Effingham and at Big Muddy. The installations at the last named places have since been removed, but the pipe at Centralia is still in service. No signs of paint can be found on it at the present time, and apparently it never had been painted.

ONE OF THE OLD PIPES COMPLETE, SHOWING RINGS AT THE THIRD POINTS

Some six-inch cast iron pipe laid at Centralia in 1868 and 1869 was taken up when the shops were abandoned in 1916. The pipe was found to be in such a good state of preservation after forty years of service that most of it was reused, no distinction being made between the old pipe and new cast iron pipe. Other examples of long life for lines of cast iron pipe on the Illinois Central include a four-inch pipe line, 1,740 ft. long, at Cherokee, Iowa, laid in 1870 and continued in service until 1900, when it was abandoned on account of a change in the location of water facilities; a line of three-inch cast iron pipe 1,175 ft. long laid at Correctionville, Iowa, in 1887, and still in use; a line of three-inch pipe 606 ft. long laid at Gaza, Iowa, in 1888 and abandoned in 1911 on account of the destruction of the water plant by fire; and a line of four-inch cast iron pipe 2,962 ft. long laid at

Webster City, Iowa, in 1869. A part of this pipe line is still in use.

These records do not do justice to the pipe because of the large number of cases where it was found necessary to reconstruct the pipe lines when increased consumption of water made the original pipe inadequate. While conditions have changed materially since these earlier installations were made, too much emphasis cannot be placed upon the need of taking future requirements thoroughly into consideration in determining the size of the pipes to be used in order that the maximum benefit of the long life of the pipe may be secured.



TWO ENDS OF A PIPE

Attention can well be called to the tendency of a cast iron pipe, in common with all types of pipe, to become more or less encrusted with lapse of time. This, however, has no bearing on the long life of cast iron pipe, since the pipes can be cleaned from time to time. For example, the Illinois Central experienced difficulty of this kind in 1913 with an eight-inch cast iron pipe line supplying water from the Big Muddy river at Carbondale, Ill. This pipe had been so encrusted that a pressure of 140 lb. per sq. in. was necessary at the pump to deliver 400 gal. per minute, which indicated that the pipe was reduced to approximately the capacity of a five-inch pipe. Upon examination it was found that the diameter was reduced to about seven inches, indicating a large increase in the friction factor as a result of the increased roughness. After studying the situation a contract was let for cleaning the pipe under a guarantee to restore it to 95 per cent of the discharge capacity of a new pipe. The encrustations removed from the pipe were estimated to represent about 16 tons of material and the work was done without taking the station out of service for more than a few hours at a time and with no interruption to train service. After the cleaning was complete a test run on the pump gave a discharge of 498 gal. per min. for an average pressure of 70 lb. per sq. in., the contractor having fully met with his guarantee to restore the pipe.

From the information presented it is clear that cast iron pipe has not been in use long enough to demonstrate its actual service life. The data on loss of thickness are too limited to permit of any definite conclusions, although indicating that the ultimate life must be many times the total number of years represented in any of the records given.

A Viaduct Built by Maintenance Forces

THE reinforced concrete highway viaduct recently built by the Delaware, Lackawanna & Western over the tracks of its newly completed replacement line between Clarks Summit, Pa., and Halstead, involved a number of interesting features in design and construction. The viaduct which carries the traffic of Milwaukee road at Clarks Summit, is 390 ft. long and has a 24-ft. clear roadway and a 5-ft. sidewalk on the west side. Beginning at the north it consists of three 50-ft. spans with the westbound slow track passing under the middle span, then three additional 50-ft. spans over the main line tracks and the eastbound slow track, all of which pass under the center span of this group, and two 45-ft. spans over one track of the old main line which now serves as the Clarks Summit town track.

The tracks at the bridge site were placed in a cut and at spread locations as shown in the photograph. The ridge between the westbound slow track and the main tracks was graded out with a steam shovel to permit the footings to be placed at approximately the same elevation. The substructure consists of bents built of reinforced concrete columns on concrete piers carried up to the proper height from the footings so as to make the lengths the same for the columns supporting the 50-ft.

THE COMPLETED VIADUCT

spans. This permits the reusing of forms. The two bents on the north are founded on rock and the others on earth with the footings designed to carry 3 tons per sq. ft. All piers adjacent to permanent tracks are solid up to a height of 6 ft. above the rails and act as a protection in case of derailment.

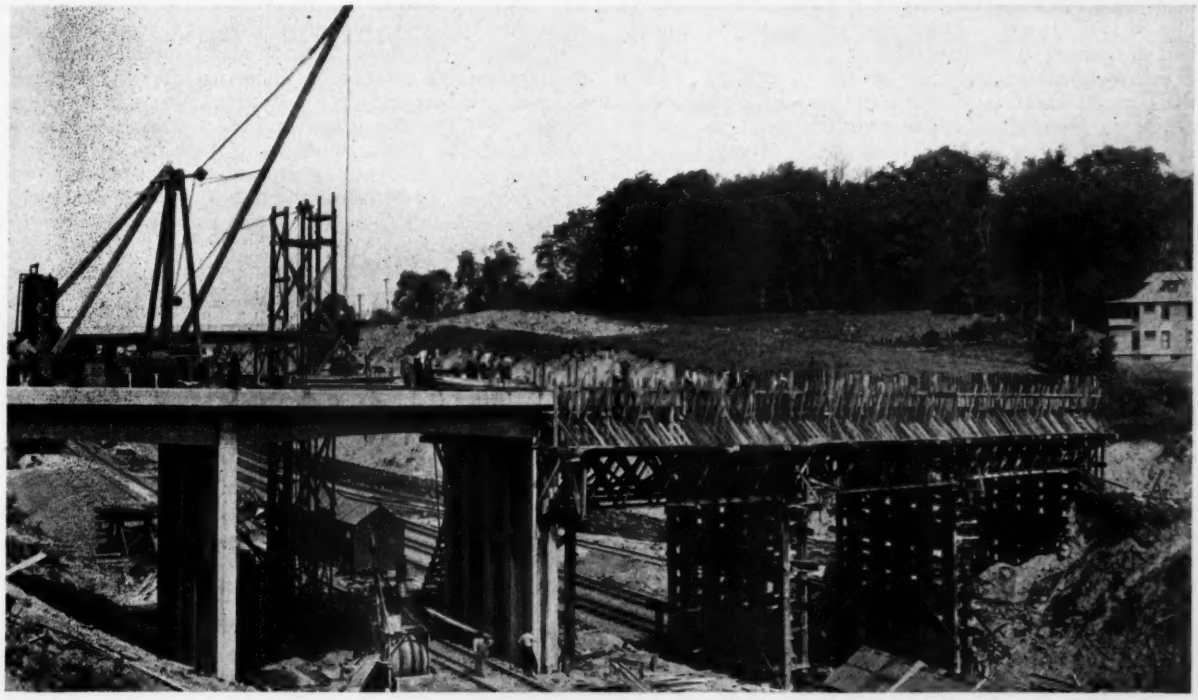
Beginning at the north, double column bents were used at every third span with a joint in the floor between the two bents to provide for temperature changes. This eliminates the necessity for transverse beams connecting the columns and for sliding joints. The three spans at the center of the bridge expand each way, bending the supporting columns which are flexible and so proportioned to be just within the limits of slenderness, the diameter being equal to 1-15 of their height. The three spans at the north and the two at the south expand from the fixed abutments.

The bridge floor was designed for a live load of 100 lb. per sq. ft. on the roadway or a 10-ton roller plus 25 per cent impact for both and 80 lb. per sq. ft. on the sidewalk. The roadway and the sidewalk are supported by five lines of longitudinal girders of varying depth, 1 ft. 6 in. wide and spaced 4 ft. 6 in. face to face. The girders are covered with an 8-in. floor slab spanning transversely with the reinforcing steel placed parallel to the skew to simplify the construction and to avoid cutting at the transverse expansion joints. The bridge is on a 25-deg. skew and, in addition to the expansion joints at the double column bents, a longitudinal joint is provided at the center of the roadway. Between the expansion joints the girders are continuous over the supports. The girders supporting the floor are curved on the under side, the 50-ft. girders having a rise of 15 in. at the center and the 45-ft. girders a rise of 12 in. The curve gives a pleasing architectural effect to the structure and the increased depth at the supports provides the necessary shear area and also for the negative moment at the support where the T-beam effect is lost. The girders are stiffened at the center of the spans and at the supports by transverse struts cast monolithic with them and a strut connects the columns of each bent.

CONSTRUCTION METHODS

The bridge was built without interfering with traffic. The erection of the 50-ft. girders and slabs was facilitated by the use of old 50-ft. trusses supported on timber bents, eliminating the necessity of placing supports between tracks. The trusses were also used to support the centering. The supporting bents which were built double with uprights on each side of the concrete columns, acted as bracing for the columns.

The concrete plant was located at the track level and the construction materials were brought in on the town track and dumped adjacent to the mixer. The concrete was wheeled from the mixer to a tower which elevated the concrete to the forms. The 45-ft. spans were built first, and after their completion were utilized as a site for precasting the concrete fence panels.



TRUSSES USED AS FALSEWORK

The bents were poured in one operation. In the double column bents where the space between columns is only 1⅜ in. the form consisted of two beveled boards wedged in place. This wedge was given a slight start before the concrete had taken its initial set and no difficulty was encountered in removing it after the concrete had fully hardened.

The concrete floor was placed in a continuous run for three spans for one-half the width of the bridge or between expansion joints. The bridge is on a 3 per cent grade and is paved with 3 in. of asphalt, eliminating the necessity of waterproofing. Drainage is provided by 2½-in. wrought iron pipes spaced 10 in. apart.

The concrete railings were erected by placing the precast panels in place and pouring the post in place around them. The panels project 3 in. into the posts.

The bridge was designed in the office of G. J. Ray, chief engineer of the Delaware, Lackawanna & West-

ern, under the direct supervision of A. B. Cohen, concrete engineer. The construction work was done entirely by the maintenance forces under the direction of L. L. Tallyn, division engineer.

The Renewal of Rail on Branch Lines

BY W. F. RENCH,
Supervisor, Pennsylvania Railroad, Perryville, Md.

THE question of rail renewal on branch lines is an exceedingly live one at this time, and will doubtless remain so for a considerable period. The high price of steel rails, coupled with an increase in the section required for a growing traffic burden, as well as the necessity of diverting large quantities of steel for purposes of national defense, has made the problem a most serious one. It seems probable that the renewals on the main line, which formerly were only sufficient in general to supply the relayer rail required for branch repairs and for new siding construction, will be cut one-half for several years to come.

The extent to which rail wear can progress before the limit of safety is reached is thus one of immediate concern. Heretofore it has generally been the outside rail of the curve that determined the necessity of renewal and various arbitrary standards for limit of wear have been suggested in recent years. The American Railway Engineering Association was unable to fix an exact standard, although recognizing fully the fact that a dangerous limit does exist. A half inch of wear has generally been accepted as the extreme amount that is safe for the high side of a curve, but necessity has shown that ¾ in. is not productive of accident, unless the joints in the opposite rail are also badly hammered. Indeed, the low rail has now become the determining factor in renewal.

It is the practice on some roads to interchange the low and high rails on curves and on others to turn the high rail when it has reached a certain stage of wear. Where the branch renewals have been made with usable second-hand rail, neither of these methods is entirely acceptable. It is believed that a better plan is to use the worn high rail to relay the low side, thus limiting the renewal to the high side alone. This has been thoroughly tested through a lean year on a branch line of heavy traffic with curves predominating in the alinement, and the results have been entirely satisfactory.

The only rail laid in the branch for a number of years was rail removed from the main line, principally of P. R. R. 100-lb. section. The rail, when so relaid, had ¼-in. wear and was reversed in relaying. After the low rail had become unfit for main track use, the high side was generally worn, between ½ in. and ¾ in. further. When the high rail was moved over to replace the low rail it supplied a natural frictionless rail. This resulted in greatly increasing the life of the renewed high rail, which was of fit material released from main line, while the battered low rail was still fit for use in storage tracks operated at slow speed.

The question of avoiding the rapid destruction of the low rail, as far as possible, presents a further proposition of importance. The mashing down of the joints, the rolling out of the head and the surface bending of the rail are mainly the result of excessive elevation for the usual speed run by the trains, or, what amounts to the same thing, a speed too slow for the elevation employed. The rail renewals are found to be least where the freight and passenger schedules are co-ordinated as closely as possible. On the branch referred to the passenger speed is 40 miles per hour, while the freight speed is 30 miles per hour. The superelevation is ¾ in. per deg., which is the theoretical elevation for a speed of 35 miles per hour. Formerly the branch carried a superelevation of 1 in. per deg., which ran it as high as 7 in., while the maximum now in use is but 5 in. A notable decrease in the destructive action upon the low rail has resulted from the 25 per cent reduction in the superelevation.

It has been definitely proven that the rail wear on the high side is only remotely related to the speed, and is mainly determined by the amount of friction present. The concrete results in diminishing rail wear on the high side by employing a narrow head section on the low side is well known to track maintainers. Similarly, the considerable increase in the wear after the tread of the low rail has become much rolled out is also appreciated. The question is met in a practical way on branch lines by the use of the doubly worn high rail for the low side of the curve. The matter is of especial interest now by reason of the tendency toward increasing the width of the rail head, 3 in. being the usual width for the heavier sections.

The manner in which the track is maintained plays a large part in rail service. If the surface is allowed to remain poor the battering of the joints, especially on the low side, is hastened. The low joint, besides being a factor in shortening the life of the rail and a cause of accident, imposes a severe strain upon the rolling stock. The maintenance of the splices is important in this connection. The moment a crack develops in one or both bars the support is diminished and deterioration of the joint quickly follows. The surfacing of the joints is especially necessary in the fall just before the frost enters and in the spring when it is leaving the track. If this feature is given proper attention much of the destructive effect at the joints will be controlled at small expense.

The prompt replacement of defective splices thus becomes a duty not only as a safety measure, but also as a means to conserve the rail. In the same way the tightening of the bolts has an effect upon the rail wear by no means negligible. The condition in which the ballast is maintained further affects the question appreciably. It has even been suggested that the sharper curves on a freight road, particularly those above 6 deg., should be in stone ballast, even though cinder may answer the general needs of the traffic over the tangents and lighter curves. The drainage is, of course, an essential requirement in any track maintenance.

The hammering out of the joints is greatly retarded by efficient anchoring of the track. All rail whether new or usable second-hand is applied with the specified opening for the temperature obtained with a standard theremometer. Unless a stable condition of the track is maintained by keeping the tie spaces filled with ballast and rails secured against creeping, an uneven joint spacing will result. This condition causes hammer blows at the wider openings, which materially shorten the life of the rails. The unequal creeping of the rails has a further effect in tightening the gage, which results in excessive wear in the vicinity of the joints, when these alone are anchored. Under a heavy tonnage, anchoring of the track is justified on single-track branch lines equally with multiple-track main lines.

HANDLING TIMBER ON A LARGE RAILWAY

The Baltimore & Ohio Has a Special Organization to Purchase and Distribute Ties and Other Wood

BY F. J. ANGIER,
Superintendent Timber Preservation, Baltimore & Ohio System

THE rapidly increasing item of tie expense led the operating officers of the Baltimore & Ohio to undertake a complete study of the tie situation in 1914. This has resulted in concentrating the inspection, treatment and distribution of all ties in the timber preservation department. This department has also been assigned in a general way to the investigation of all phases of the tie and lumber business on the railroad, with the idea of securing the greatest possible economy in the use of wood through the selection of the best species, sizes, etc., to be employed in each instance. This arrangement was made in the belief that if the entire responsibility for this heavy expenditure was concentrated in one department better results would be attained than by leaving it as one of several duties of the different departments interested in the use of timber.

THE INSPECTION AND USE OF TIES

The work of the timber preservation department was originally limited to the operation of the timber-treating plant at Green Spring, W. Va., where approximately 1,000,000 ties per year, and other timbers, are treated; and to the inspection of ties and timber treated by contract at other points. The method of treating cross-ties on the Baltimore & Ohio is with a combination of zinc and creosote, known as the Card process. The practice is to make the preservative solution of such strength that, after pumping to refusal, ½ lb. of zinc chloride and 3 lb. of creosote will be left in the wood.

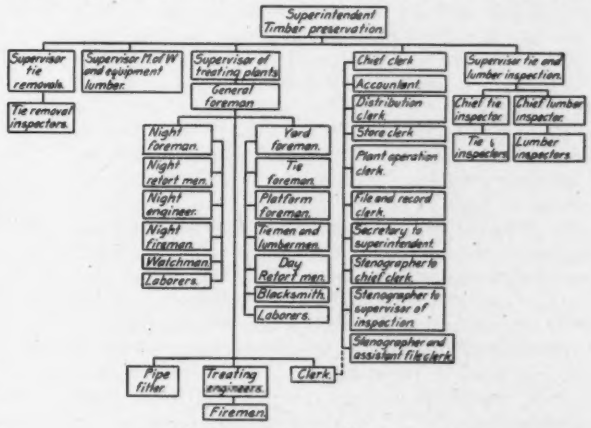
The treating plant at Green Spring, W. Va., consists of two treating cylinders each 7 ft. in diameter and 132 ft. long. A charge consists of about 600 ties, and these can be thoroughly treated in about 6 hours. The plant was built four years ago and was described in the *Railway Age Gazette* of June 20, 1913.

In 1915 the duty of inspecting all ties before purchase was delegated to this department, the purchasing agent first negotiating with producers who notify the superintendent of timber preservation when ties are ready for inspection. Each inspector is assigned to a certain district to relieve him of the necessity of making long trips and to enable him to become familiar with the situation in his particular territory. It has been the aim of this department to secure ties which come up to the specifications, and to make inspections promptly after the ties are produced along the right of way. When ties are produced on foreign lines the inspection is made when they are loaded.

If the specifications of the Baltimore & Ohio are followed exactly they will secure excellent ties. To keep the work of the inspectors at a uniform standard, it has been found desirable to have them meet occasionally at the Green Spring treating plant, and go over a large number of ties, such as are stored there for seasoning, to see that each man has a clear idea of the ties which should or should not be accepted.

The tie schedule formerly in use has been elaborated considerably to specify the ties which should be used on different divisions. In many cases the divisions have been further divided into districts varying with the topography, density of traffic, preponderance of grade and curvature, etc. A complete schedule has been prepared for the entire system, and the most economic tie for every condition of track and traffic determined upon. This schedule shows the first, second and third choice of ties for every district, as it is recognized that, for various reasons, the most economical tie cannot always be furnished. One feature entering into consideration is the question of the haul of treated or untreated ties. For example, the hauling of treated ties out to the ends of outlying branches and the bringing in to the main line of white oak ties from the ends of these same branches is naturally to be avoided. On some of the heavy mountain grades the use of treated ties has not been recommended.

To decide upon the most economical tie, the first cost, installation and handling costs were used to arrive at the total cost in track. The cost per tie per year was then computed by dividing by the assumed life and adding the interest at 6 per cent. In order to determine what the assumed life was to be in each case the records of the Baltimore & Ohio were used, and also data published by the American Wood Preservers' Association



ORGANIZATION CHART

and the American Railway Engineering Association, as well as the opinions of many experienced maintenance of way officers. The effect of curvature on the use of tie-plates was also studied and considered in the preparation of the schedule, as a result of which it was found that in some locations where traffic density was heavy and where hardwood ties were used the use of tie-plates was not economical.

Another innovation was in the handling of switch-ties. The custom on this road for some years had been to spot in single switch-ties the same as cross-ties. To prevent the long storage of small supplies of switch-ties at many different points, with their resulting deterioration, an arrangement was made for the storekeepers to order their supplies of switch-ties in accordance with the inspection or spotting made by the division forces who later made out an order for the exact number and lengths required. The division storekeeper then carries at the storehouse only the stock required for his division,

and few additional extra sizes for emergencies, or new work. This has prevented carrying odd lengths year after year and ordering more than are used.

The timber preservation department has also been given the duty of inspecting ties removed from the track with the idea that if one essential to tie economy is to furnish good ties the second is to leave them in track as long as they will continue to perform their function satisfactorily. The importance of securing the complete life from each tie made it appear worth while to provide an independent check on the ties removed from track to ascertain whether they might not have further value; therefore this department has a small force of inspectors who travel over the road and examine ties removed before they are burned. The ties are piled after removal, but they are not burned until the inspector has gone over the territory and marked those which should be preserved. The maintenance of way department then takes charge of the ties which are saved and uses them as it sees fit. The supervisors either have the foreman put these ties back in track or use them for temporary sidings, back-tracks in yards, etc. This system is satisfactory in practice, as it deters foremen from removing ties which are still good.. The inspectors do not find many good ties being removed, this inspection being similar in effect to insurance—a protection against possible loss.

MAKING THE BEST USE OF LUMBER

Another new duty of this department is to inspect lumber before purchase, study the methods of piling and storing, and investigate its use for both maintenance of equipment and maintenance of way purposes in order to see that the most economical kinds, grades, lengths and thicknesses are ordered and used. One of the first steps in this work was to give inspectors the particular training necessary regarding the grades to make certain that the lumber received is in accordance with what was ordered and what the dealers bill the company for. The inspection of lumber is a highly specialized work, and there is such a large difference between the prices of the different grades that unless a great deal of care is given to the inspection of lumber when received a railroad may easily lose many dollars on each car. A shortage of as little as 250 ft., board measure, of lumber at $40 a thousand will result in an overcharge of $10, and even a greater loss may readily be incurred by accepting as No. 1 what might be No. 2 common or even a lower grade, especially in the car stock, much of which is expensive material. The checking up of the use of proper kinds, grades, sizes, etc., is in the hands of a supervisor of maintenance of way and equipment lumber, and a man with wide experience in car building was selected for this position.

The investigation of many cases where treated wood may be used profitably is being carried on continuously. Some of these cases are the preservative treatment of white oak ties, switch-ties, piling, tie-plugs, etc.; wood block paving for shops, team yards, warehouses and docks, and the preservation of lumber for icehouses, road crossings, platforms, etc.

The latest addition to the duties of this department is the distribution of cross-ties and switch-ties. There are three separate organizations of the Baltimore & Ohio which require ties—the New York terminal lines, the Eastern lines, and the western lines. This department also handles such work for the Baltimore & Ohio Chicago Terminal railway and the Cincinnati, Hamilton & Dayton railways.

Owing to the belief of the management that the distribution of the supply for these separate organizations can be handled better by one central body than to have each organization negotiate for its own ties, an arrangement was made late last year to place the distribution of ties in the hands of the timber preservation department. After the allotments are agreed upon, the engineers maintenance of way of each of the above organizations order a certain number of ties for each division from the timber preservation department, and as the ties are produced, inspected and treated (where required), this department distributes them.

The distribution described above works in with the inspection before purchase already described, because the timber preservation department knows the production situation in every district and on foreign lines, and can push inspection in places necessary, or ship in from foreign territory where the conditions of haul, etc., make it most economical. This arrangement should eliminate, or at least minimize, expensive cross-hauls.

The chart outlines the organization which has been developed to handle this work.

RAILWAY REGIMENTS PREPARING

ENLISTMENTS in the railway regiments organized for service in France has been exceedingly active and most of the units are now recruited to full strength. The nature and purpose of these organizations were outlined in last month's issue. There are nine regiments in all; three are known as operating regiments, with headquarters at Chicago, Boston and St. Louis; five are construction regiments, organized at New York, Pittsburgh, Detroit, Atlanta and San Francisco, and the last, a shop regiment, is now quartered at Philadelphia. The organization of the operating regiments follow the outline of the operating department of a railroad and they will be expected to operate military railway lines in France, each company being organized to take care of a division. The construction regiments are expected to reconstruct and maintain existing railways or lines recaptured from the enemy.

With the exception of the colonel and captain-adjutant of each unit, who are regular army engineer officers, all of the officers and enlisted men have been recruited either from railways or from contracting or other allied activities. Railway engineering and maintenance officers who have received commissions in these organizations include the following who have not been mentioned previously in these columns. The Third (operating) regiment, Chicago, includes J. W. Kern, Jr., supervisor, Illinois Central, Mounds, Ill., second lieutenant; William E. Haberlaw, roadmaster, Rock Island, at Rock Island, Ill., second lieutenant; Fred W. Sawtelle, roadmaster, Chicago, Milwaukee & St. Paul, Horicon, Wis., second lieutenant. The Sixth (construction) regiment is expected to include George H. Webb, chief engineer, Michigan Central, Detroit, lieutenant-colonel; Charles G. Williamson, instrument man, Michigan Central, Detroit, first lieutenant; E. I. Van Antwerp, resident engineer, Grand Trunk, Detroit, first lieutenant, and B. F. Pontey, assistant engineer, Michigan Central, first lieutenant. In the Fourth (operating) regiment, Boston, Benjamin W. Guppy, engineer of structures, Boston & Maine, Boston, Mass., is major of the first battalion, and Charles Wesley Lewis, track supervisor, Boston & Maine, Portsmouth, N. H., is captain of Company A. In the Fifth (operating) regiment of Pittsburgh, J. L. Taylor, Jr., assistant engineer, Pennsylvania Lines, Pittsburgh, is captain of Company B, and D. C. Martin, supervisor of track, New York Central, Elyria, Ohio, is second lieutenant. In the Seventh (construction) regiment, Atlanta, C. S. Coe,

superintendent, maintenance of way, Florida East Coast, St. Augustine, Fla., is captain of Company C; R. M. Lawton, assistant engineer of construction, New York, New Haven & Hartford, New Haven, Conn., is first lieutenant, and Everett A. Craft, assistant engineer, Chicago & Eastern Illinois, Salem, Ill., is first lieutenant. In the Eighth (construction) regiment, San Francisco, the names mentioned include J. R. Holman, formerly chief engineer, Oregon-Washington Railroad & Navigation Company, lieutenant-colonel; J. W. Williams, chief engineer of construction, Northwestern Pacific, San Francisco, major of the first battalion; Harry L. Kile, roadmaster, Western Pacific, Portola, Cal., first lieutenant; Bert J. Simmons, division engineer, Atchison, Topeka & Santa Fe Coast Lines, Needles, Cal., captain of Company B, and T. W. Saul, division engineer, Oregon-Washington Railroad & Navigation Company, Portland, Ore., first lieutenant. The roster of the Second (construction) regiment, St. Louis, includes F. G. Jonah, chief engineer, St. Louis-San Francisco, St. Louis, major of the First battalion; Clarence C. Brown, maintenance of way department, St. Louis-San Francisco, first lieutenant; J. H. Brooking, assistant engineer, St. Louis-San Francisco, St. Louis, first lieutenant; John J. Callahan, valuation department, St. Louis-San Francisco, second lieutenant; A. W. Galbraith, assistant engineer, Pennsylvania Lines, St. Louis, first lieutenant; S. M. Smith, assistant engineer, bridge department, Wabash, St. Louis, Mo., first lieutenant, and F. D. Nash, pilot engineer, valuation department, St. Louis-San Francisco, first lieutenant.

The Chicago railway regiment is enlisted to full war strength. The men are quartered on the Chicago municipal pier, where the men will receive preliminary training prior to departure for France. The St. Louis regiment is in camp on the bank of the Mississippi river near that city, government house boats being used for quarters instead of tents. The New York regiment is in camp at Ft. Totten and was recruited to full strength early in June.

Planting Shrubbery to Protect Slopes*

BY J. M. DAVIS,
Vice-President, Operation and Maintenance, Baltimore & Ohio, Baltimore, Md.

THE following is taken from Farmer's Bulletin 494, "Lawn Soils and Lawns":

"Terrace banks, wherever possible, should be covered with creeping shrubs, woody vines or trailing plants. Grass should be used only where absolutely demanded. The objections to a grass bank are two: First, the difficulty of maintaining a close turf on a steep incline; second, the great difficulty and consequent additional cost of keeping it properly trimmed.

"Where grass is chosen for the covering, sodding is usually the most satisfactory. For the blue grass regions, the Kentucky blue grass is best on clay soils. On lighter soils use Canadian blue grass; Rhode Island and creeping bent, sheep, red and hard fescues. As a last resort in difficult places use orchard grass with plenty of other grasses. In any case, keep reseeding constantly and heavily. From Washington, D. C., to Texas, outside of the blue grass region, use Bermuda grass. In California from San Francisco southward use Pacific rye grass or Bermuda grass on the lighter soils.

"On banks too steep for walking over readily, upright shrubs may often be planted advantageously. If the banks are liable to wash, such drooping shrubs as drooping golden bell (Forsythia suspensa) or matrimony vine (Lycium chineuse) can be used to advantage, their drooping stems running along the ground and rooting at frequent intervals and holding enough leaves to prevent wash. Such bushes will often form a mass of foliage six feet high.

"Where lower forms are essential, *Japanese honeysuckle* (Lonicera Japonica), Virginia creeper (Psedera quinquefolia), or English ivy (Hedera helix), may be used, or the more herbaceous plants like money wort (Lysimachia mummularia), creeping Jenny (Glecoma hederacea), and myrtle (Vinca minor). These plants are as easy to establish on a bank as turf. They do not require frequent clipping. After once established they require only slight attention. They make a more perfect cover than grass and maintain themselves better.

"The Japanese honeysuckle may become a nuisance by climbing over any bushes or fences within reach. Its seed is easily carried by birds and it is already naturalized over a large part of the eastern states.

"The Virginia creeper is not quite so persistent, but is native over the whole country. The English ivy is not hardy in the northern sections. In the extreme South the variety, Hibernica, should be used. For ground cover in shade where it is difficult to grow grass, the English ivy, money wort, myrtle and a Japanese form of the mountain spurge are excellent."

The American Railway Engineering Association committee on Roadway for 1915 had a sub-committee on "Specifications for the Protection of Slopes by Sodding or Otherwise," which reported in part as follows:

"A general letter was sent to all roads and 124 replies were received. Sixty-eight had nothing to offer, while 83 practiced sodding to a limited extent and 15 to a much greater extent. Several advocated the use of cinders, while others advocated the use of honeysuckle or willows on wet slopes."

JAPANESE HONEYSUCKLE

F. L. Mulford, landscape gardener, Bureau of Plant Industry, United States Department of Agriculture, gave the following information:

"There is nothing peculiar about the requirements of the honeysuckle for growth on slopes of cuts and fills. It may be transplanted successfully at almost any time of the year, of course, most successfully in the dormant season. At any time it is transplanted it is desirable to remove most of the top.

"There are two forms that are quite common through the section of the country about Washington, D. C. One, the Japanese honeysuckle (Lonicera Japonica), has a white flower sometimes pinkish or purplish with the new stems of a rather purplish hue. This form is not quite as vigorous as the other, Hall's variety of the Japanese honeysuckle (Lonicera Japonica, halliana), which has white and yellow flowers; but either one would be satisfactory for the purpose of slope protection.

"These varieties of honeysuckle are regarded as nuisances by the farmers, because of their persistence in

*Abstracted from a report made at the request of F. D. Underwood, president of the Erie.

growing along fences and in waste places where they once become established."

Lt.-Col. Charles W. Katz, Corps of Engineers, U. S. A., the present engineer commissioner of the District of Columbia, described the protection of slopes in Rock Creek, Washington, D. C., as follows:

"The planting of slopes in Rock Creek park with honeysuckle, particularly on the upper Beach driveway and at the east end of the Pierce Mill bridge on the Pierce Mill road and on the Morrow road, was done in the following manner:

"The bank was roughly graded to the required slope, which may be as steep as two feet vertical to one foot horizontal.

"Horizontal ledges about 8 to 10 in. wide were formed in the face of the slope, these ledges being about two feet apart vertically, with the back of the ledge about 4 in. deeper than the front; or holes about 10 in. in diameter and 6 to 8 in. deep were dug in the slope at vertical and horizontal intervals of about two feet.

"The ledges or holes, as the case may be, were filled with soil, usually consisting of street cleanings or well-rotted manure mixed with the bank material or loam.

"The plants were transplanted about 1½ or 2 ft. apart from other places where they had grown up voluntarily, with as much root and native earth as practicable, into the holes or shelves formed for them. This should be done early in the spring or in the fall after dry weather is over. If done at these times, no watering is required, unless the weather should be dry soon after planting.

"The embankments where this has been used are mostly of rotten gneiss, containing very little plant food. A good stand has usually been obtained in one year and a heavy growth covering the entire surface in two or three years. Plenty of manure should be used, as this retains the moisture necessary; and the plants to be set out should be carefully taken up from the original bed.

"There is no doubt that honeysuckle properly put out is a most successful cover for the sides of cuts. It can also be used in a similar way for embankments after they become well settled."

The Washington Southern railroad has a section of track on a 10-ft. fill in the District of Columbia, just across the bridge south of the new building of the Bureau of Printing and Engraving. This fill has a one to one slope of clay, sand and gravel, and has been thickly covered with Japanese honeysuckle. Street sweepings were used as fertilizer.

In August, 1908, H. W. Vinall, scientific assistant, Bureau of Plant Industry, United States Department of Agriculture, wrote as follows:

"We have demonstration of work of this kind on the Southern railway embankment on the south side of the city near the Potomac river. This railway has used the Japanese honeysuckle with remarkable success. Last spring plants of this honeysuckle were set out about 18 to 24 in. each way. Nearly every plant has grown and its ability to take root from runners has caused it to cover nearly every foot of open soil. I think for this section of the United States it is one of the most promising of plants for protecting embankments of this kind."

CONCLUSIONS

It appears that Japanese honeysuckle may be used to obtain effective covering and protection of settled slopes as steep as two feet vertical to one foot horizontal if intelligently transplanted into a soil with plant food and moisture conditions within reasonable limitations.

In general, plant life is not supported on a "sub-soil" such as that which usually constitutes the face of deep cuts until it has undergone considerable modification through exposure to elements and natural or artificial fertilization. It would be useless to set honeysuckle or any other plant in a soil which contains no plant food or a soil of texture such that moisture cannot penetrate.

The method of using a soil made up of street sweepings of similar fertilizer mixed with the bank material or loam and held in ledges or pockets in the "sub-soil" face of the slopes has proven definitely successful in establishing a heavy growth of honeysuckle in two or three years' time.

The plants should be transplanted in the late fall or early spring with as much root and native earth as possible. Most of the top or vine should be trimmed away.

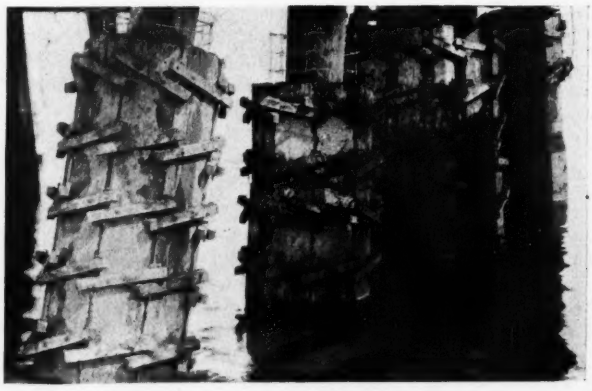
PROTECTION FROM MARINE BORERS

IN the construction of the trestle approaches to the bridge over Coos bay on the Willamette Pacific, a subsidiary of the Southern Pacific between Marshfield and Eugene, Ore., the piles were protected against attack by teredo and limnoria by covering them with a jacket of concrete from high tide level to below the mud line. One hundred and fifty-two bents were encased in this manner. The concrete was applied by methods which proved both economical and successful.

The piles in the trestles are of Port Oxford cedar except for 36 bents in which creosoted Douglas fir was used on account of the length necessary, which was greater than could be obtained readily in cedar. The latter is an excellent material for piles, examples 40 years old being common. It grows in a small territory in the vicinity of Coos bay and is used extensively for railroad ties and piles.

The average length of protection on the piles is 9.3 ft. for 130 bents and 14.5 ft. for 22 bents. The concrete averages 5 in. in thickness and is reinforced with one concentrically placed layer of Clinton welded wire reinforcement consisting of a 3-in. by 12-in. mesh of No. 8 and No. 10 gage wire.

One of the illustrations shows the novel form construction used for this work, which was put on by A.

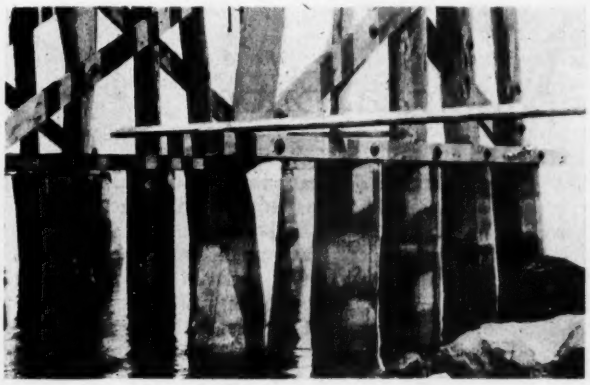


FORMS IN PLACE

Neubert, a master diver of Oakland, Cal., who is said to have a patent on the design. The form consists of vertical boards beveled on the edges to give a tight joint, conected by cleats placed in inclined positions and fastened together by means of 80d nails dropped into holes drilled in the adjoining cleats. The nails were bent over at the top to form levers and were bent throughout the length to give a slightly cranked form. By turning the nails by means of the lever at the top,

after they are in place, the offset bend served to draw the forms together.

The forms were put in place by a diver. The concrete was mixed by hand from barges and placed at the rate of about 40 lin. ft. of concrete pile casing per day. All concrete below water level was placed by means of



THE PROTECTION COMPLETED

a small tremie. The last of the protection has been in place about five months.

We are indebted for the above information to G. W. Rear, general inpector of bridges, Southern Pacific, San Francisco, Cal.

RATE HEARING COMPLETED

THE hearing before the Interstate Commerce Commission on the general 15 per cent advance in freight rates was completed on June 12 and is now up to the Commission for a decision. A brief account of the testimony of the railroads which was given on June 9 to 12 inclusive was recorded in last month's issue. The railroad witnesses were cross-examined by representatives of the shippers and the state commissions on May 23 to 25 inclusive. Testimony in opposition to the rate advance by shippers and representatives of the commissions was given on May 31 to June 1 and all testimony was closed on June 7. Arguments by both sides followed and were completed on June 12.

The opposition to the rate advance placed special stress on the large earnings and surplus of the small number of more prosperous roads. Attention was also directed to the proposed bills for limiting the prices to be charged for railway supplies as a feasible means of obviating the necessity for the advance in rates. In reply to an inquiry regarding the disadvantage which some shippers would suffer because of the advance in rates, C. H. Markham, president of the Illinois Central, replied that a shipment of freight at the present time was not a question of rates, but a more momentous one of whether a shipper could get service at all or not. In reply to another question he said that the Illinois Central could live without the advance, but would not be able to keep up with the demand for increased service.

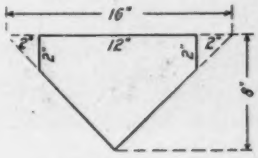
The possibilities for economies as a result of the operation of the railroads along the revised methods recommended by the Railroads' War Board was a matter of considerable conjecture, but Howard Elliott and other railroad officers called attention to the fact that these recommended practices were designed primarily to expedite service and that economy was of secondary consideration. In cross-examining the shippers they were asked frequently concerning the increase in the prices of the commodities in which they were interested. Attention was directed to the fact that the 45-cent freight rate for flour from Minneapolis to Washington had very little to do with the price of flour at $17 per barrel. Representatives of the Chicago Association of Commerce, the Industrial Traffic League and other interests favored temporary advances in rates as a relief from the present situation. J. M. Glenn, secretary of the first-named organization, expressed his desire that the raise in rates would be granted quickly because of his realization of the dire need of the shippers for increased facilities.

In their rebuttal the railroads presented charts showing the rise in the prices of various commodities as compared with the unchanging freight rates. A large amount of testimony was also given to show the decreased popularity of the railway securities for investment purposes and the actual decline in the price of railroad bonds. Final arguments for the railroads were presented by various railway counsel, among whom Charles Donnelly, assistant to general counsel of the Northern Pacific, made the following pertinent statement: "It is a cardinal principle of rate-making that the value of the service, as well as the cost of the service, is to be considered in determining what the freight rate shall be. Viewed from this standpoint also the increases are justified. The commodities which the carriers are now moving have increased in value from 50 per cent to 200 per cent since the freight rates on which they move were established. Such traffic can easily pay the increase proposed and this is generally recognized by those who must pay it. The sentiments of shippers regarding the proposed advance, as evidenced by hundreds of petitions addressed to the commission is overwhelmingly in favor of it."

TRIANGULAR TIES

THE Great Northern has in track approximately 3,000,000 triangular ties which are giving excellent service. These ties are all sawed ties, 8 in. deep and 12 in. across the face with 2 in. cut away from each of the two upper corners. The first of these ties were installed in the main track in 1901, since which time from 150,000 to 200,000 ties have been inserted annually. Nearly all of them have been treated with either a 4 per cent or a 6 per cent solution of zinc chloride.

One advantage of this triangular cross-section is that the tie is more susceptible to uniform impregnation by



STANDARD DIMENSIONS OF THE TIE

the preservative than ties of rectangular section. Another advantage is that the bearing area of a tie of this type is greater in proportion to the amount of lumber contained in it. In certain kinds of ballast these ties are more or less self-tamping, particularly at the joints, since small particles of ballast roll down the 45 deg. slopes under them readily and reduce the settlement. In a dry, sandy country this self-tamping action has been found sufficient to cause the joint ties to be lifted above the general surface of the rail, resulting in high joints.

When inserting the triangular ties they are laid out of face. It has been found impractical to spot them in

with those of more nearly rectangular cross-section because the triangular ties settle more than rectangular ties do before coming to a full bearing, and when the two classes of ties are used together it has been found that the triangular ties do not come to a full bearing.

In their manufacture two or four ties are cut from a log, depending on its size. When only two ties are made from a log they must be placed in the track with the heart up, which is objectionable, as it permits the water to penetrate the wood more readily. Therefore, wherever possible logs are selected which will permit four ties to be manufactured, in which case the heart wood is at the apex or bottom of the tie when placed in the track.

Quick Work in Repairing a Bridge

THROUGH the quick action of the men of the bridge department in clearing away the wreckage and making temporary repairs at the crossing of the Mystic river at Boston, Mass., the Boston & Maine was enabled to restore traffic on its Eastern Division in a little more than three hours after it was interrupted by the collapse of the drawbridge at this point. The accident occurred at 4:30 p. m., on May 28, after the heavy out-bound traffic of the day had begun, when an improperly welded link in one of the supporting cables parted as the bridge was being swung back to place after being opened to permit the passage of a tug. The bridge is used jointly by the Boston & Maine and the Boston & Albany railroads with trains carrying commuters to Everett, Chelsea, Rivere, Lynn, Salem, Beverly, Hamilton, Wenham, Ipswich, Newburyport, and also by the Portland and the New Brunswick trains. All train schedules of the division were upset by the accident, and until temporary repairs were made many of the passengers were accommodated on trains which were detoured over other divisions. At 7:30 p. m. the wreckage had been sufficiently cleared to allow one of the track sections to be replaced and at 7:45 p. m. the first train passed over the bridge.

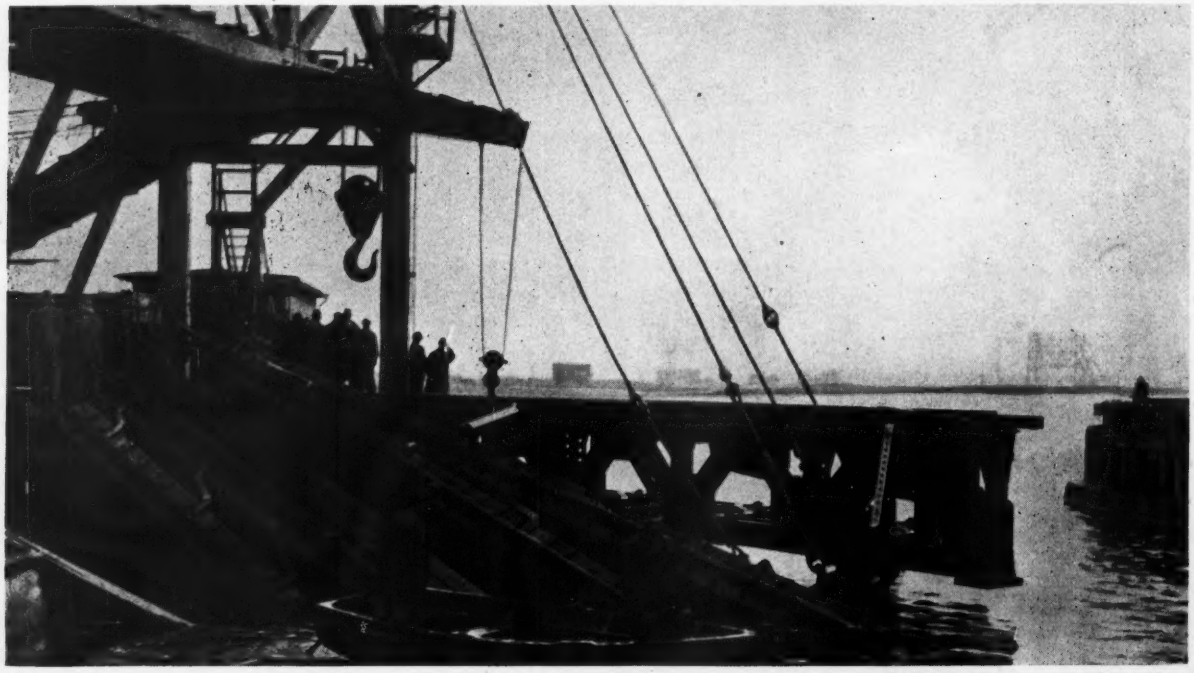


Photo by courtesy of the Boston Post.

CUTTING THE OUTSIDE SPAN FREE OF THE WRECKAGE

The bridge that fell is of the jack-knife draw type, invented by Joseph Ross, a Boston contractor, now dead, and used extensively in the vicinity of Boston. It consists of three spans, one carrying the Boston & Albany track, one the inbound Boston & Maine track and the third the Boston & Maine outbound track. In this type of drawbridge the spans have no floor system, but each span consists of two riveted deck lattice trusses connected with pivoted tie rods, the rails being fastened directly to the top chords of the trusses by means of clips. The pier at the free end is placed normal to the center line of the bridge and the abutment at the fixed end at a sharp skew. A tower spanning the tracks is provided at the fixed end and needle beams under the trusses at the free end. To open the draw for the passage of water craft the free end is lifted clear of its bearing on the supporting pier by means of cables from the tower that are attached to needle beams. Once clear of their bearings, the spans are swung through a horizontal angle of 90 deg. to a position parallel to the stream. As the bridge is swung around, the absence of a floor system and the pivoted tie rods permit the trusses to close up with an action similar to that of a pantograph, thus conserving space. The skew provided in the abutment is sufficient to allow the spans to assume a position parallel to each other when the bridge is entirely open.

As the free ends of the spans rest on a supporting pier when the bridge is in a normal position, the cables have

no duty to perform except the turning of the spans. Because of this fact a break in the cables could only occur during the turning of the bridge. In this instance, as the bridge was being swung from the open position to normal, one of the links connecting a supporting cable to the needle beam under the trusses carrying the Boston & Albany track gave way and the shock to the other supporting cable threw it off the pin at the top in the tower, allowing the span to fall. Through their pantograph movement, the trusses of the several spans were in close contact, and in falling the Boston & Albany span carried the Boston & Maine outbound track span with it and seriously fouled the inbound track span, tying up traffic on that track.

After the accident an examination of the bridge showed the trusses to be intact and that the damage was confined to the equipment for swinging the spans. It was also found that the Boston & Maine inbound track span was free from the wreckage except for the needle beam and cables. It was therefore decided to cut away the entanglement by means of blow-torches and utilize this span in restoring traffic over the river.

After this span was cut free from the wreckage it was picked up by derricks working from lighters and landed on its supports. A wrecking derrick was also utilized in the operation, but because of the position of the span in the water it was of little use and a second accident was narrowly averted when the wrecking derrick was nearly drawn into the water in lifting on one of the spans.

As the swinging equipment was destroyed in the fall, the span when restored to its support acted only as a fixed bridge. With the span in place temporary connections were cut into the inbound Boston & Maine track from the others and traffic was resumed with little incident delay. The remaining two spans were picked up on the following day and restored to their bearings as fixed spans and traffic resumed over the three tracks.

As an interesting sidelight on the accident most of the bridge was new and had been completely inspected and given the approval of the Public Service Commission on the Thursday preceding the accident. At the time of the inspection no sign of improper welding of the link that parted was found.

Electric Tie Tampers on New York Central

ELECTRIC tie tampers were first used on the New York Central in 1913. The first pneumatic machine from which the electric tamper was developed was made in a blacksmith shop. The results of the test were so satisfactory that further studies were undertaken, as a result of which the design was improved until the present type of electric machine has been developed. The tampers now used weigh 90 lb. complete, the tamper, itself weighing 86 lb. and the bar 4 lb. The motor is contained in a bell on the side of the machine and drives a crank in the back of the casing. The crank, in turn, moves a reciprocating cylinder within which is a free piston driven back and forth by the air compression in the cylinder and a solenoid at the lower end of the tamper, the reciprocating cylinder shifting the magnetic field produced by the solenoid. Suitable handles are provided to support the tool at its center of mass and a specially-designed nose piece holds the tamping bar in place. The control is located in a switch mounted in the upper handles.

THE TAMPER

Twelve of these machines are now being used in the electric zone and others are in service in the exterior zone. In the electric zone the current is taken from the third rail and is conveyed to the machine through resistance boxes by means of a contact device which is laid across the rails. The resistance used is similar to that in the heaters installed in electric cars and is manufactured by the Gold Car Heating & Lighting Company, New York. The resistance unit is 10½ in. high, 12 in. wide, and 42½ in. long. In the exterior zone the power is secured from a generating set mounted on a hand car which weighs complete 2,150 lb. The equipment consists of the car and a 4-hp. gas engine connected to a 220-volt generator and equipped with a clutch so that the engine may be used to drive the car. The outfit supplies ample power to operate two tampers with a surplus for lights and drills. As a further development it is being planned to use the tampers in the electric zone between Utica, N. Y., and Syracuse. In this district, because of the varying voltage, it is not possible to use the resistance as in the electric zone. Instead it is proposed to use a motor-generator set designed and built by the Electro-Magnetic Tool Company, of Chicago, in which both the motor and generating set are compound-wound. This motor-generator set is so designed as to take care of the fluctuation in the voltage and as the weight is only 240 lb. it can be handled easily by three men. If used, the generating set will probably be enclosed in a strongly constructed box and moved from point to point as required. A third rail contact device has been designed which need not be removed for traffic. The cost of the outfit, including the motor generating set, third rail contact device and three tampers, is $970, and the cost of the operation is seven cents per hour on the basis of three cents per killowatt, plus 10 per cent for accounting.

In tamping track the machines are generally operated in sets of three so that, in case of accident, an extra tamper is at hand with which to continue the work. The tamping is done by two machines operating simultaneously on opposite sides of the tie. With them it is possible to tamp ties closer together that would be impossible by hand, all the space necessary being that into which the tamping bar can be driven. They are especially useful around switches where the ties are closely spaced.

Some very interesting data have been compiled showing the cost of work done with the machines as contrasted with hand work. A test was made late in the winter under unfavorable working conditions with a generating set assigned to a regular main line section gang consisting of one foreman and five men. Two men were assigned to each machine, four doing the tamping and the fifth digging out and feeding ballast to the ma-

chines, dressing up the track, etc. The work consisted in making the final surface after the track had been raised 12 in. previously, but had not yet been put in service, the ties being tamped 16 in. on the outside of the rail and 8 in. on the inside. Under these conditions

CURRENT SUPPLIED BY A GENERATOR

an average of 27 ties were tamped per hour. The following tabulation shows the daily cost of this work:

1 Foreman, 8 hr. @ 26 ct	$2.08	
5 Men, 8 hr. = 40 hr. @ 17 ct	6.80	
Gasoline, 4 gal. @ 12 ct	.48	
Engine oil, ⅔ pt. @ 5 ct	.03	
Total per day	$9.39	$9.39
Time of crew going to and from work		1.11
Total cost		$10.50

Another test shows the comparative cost of tamping a mile of track by hand and by machines. Tamping by hand, one foreman and 6 men at a cost of $11.52 per day tamped one mile of track in 26 days, with a total cost of $299.52. With the machines a foreman and five men at a total daily cost of $10.50, including supplies, tamped one mile of track in 15 days at a total cost of $157.50, showing a difference in cost in favor of the machines of $142.02 per mile of track tamped.

Comparative costs of tampers operated from generators and the third rail are also available. Taking the cost of a generator at $500, two tampers at $400 and two resistances at $100, including contacts, cables, etc., and figuring the depreciation and interest on the as-

TAKING CURRENT FROM THIRD RAIL

sumption that the machines are used 180 working days per year, the following figures are obtained:

TIE TAMPERS OPERATED FROM A GENERATOR

Operation—	
Foreman, 10 hr. @ 27 ct	$2.70
5 Men, 10 hr. each = 50 hr. @ 19 ct	9.50
Gasoline, 4 gal. @ 20 ct	.80
Engine oil, ⅔ pt. @ 5 ct	.03
Fixed Charges—	
Depreciation—generator @ 15 per cent	.42
Depreciation—two tampers @ 30 per cent	.67
Interest and maintenance—generator @ 10 per cent	.28
Interest and maintenance—two tampers @ 15 per cent	.33
Total per day	$14.73

Average of 356 ft. tamped per day. Total cost per foot $0.041.

TIE TAMPERS OPERATED FROM THIRD RAIL

Operation—	
1 Foreman, 10 hr. @ 27 ct	$2.70
6 Men, 10 hr. each = 60 hr. @ 19 ct	11.40
Power, 96 kw. hr. @ 1 ct	.96
Fixed Charges—	
Depreciation—two tampers @ 30 per cent	.67
Depreciation—two resistances @ 15 per cent	.08
Interest and maintenance—two tampers @ 15 per cent	.33
Interest and maintenance—two resistances @ 10 per cent	.06
Total per day	$16.20

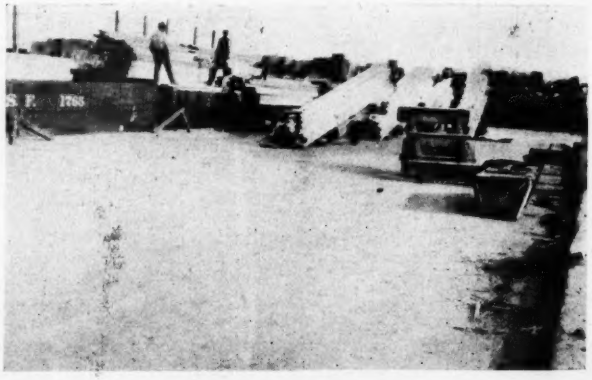
Average of 356 ft. tamped per day. Total cost per foot, $0.046

In the above test the tampers were in actual service an average of 8 hours out of the 10-hour day. Where the tampers are operated from the third rail six men in the gang are necessary, as a watchman is employed who does nothing else except look out for trains.

The tamping machines are the Vaughan type, designed and patented by G. W. Vaughan, engineer of maintenance of way of the New York Central. They are manufactured by the Electro-Magnetic Tool Company, Chicago, Ill.

ASPHALT SURFACE ON A WHARF

EXCELLENT service is reported from an asphalt concrete surface on a wharf owned by the Southern Pacific at San Pedro, Cal., part of which has been in use for over six years. The new asphalt surface was



THE FLOOR IN SERVICE

placed over old worn decking that would have required renewal in a short time on account of truck wear.

This asphalt concrete consists of asphaltic cement, stone dust, sand, screenings and broken stone, mixed in proportions that would give the greatest density, the proportions used being shown in the table below:

Asphaltic cement	6 to 9 per cent
Stone dust	4 to 8 per cent
Sand	16 to 24 per cent
Screenings	16 to 24 per cent
Crushed rock, ¾-in. size	36 to 56 per cent
Average	100 per cent

These materials were combined in a rotary mixer after all the ingredients had been heated to temperatures carrying from 250 to 325 deg. F., care being taken that

the asphaltic cement should never exceed the higher temperature.

The resultant mixture was spread over the floor with hot tools to a sufficient depth to give a pavement 3 in. thick after the rolling had been completed. A 2½-ton roller was used until the paving material had attained a consistency that would permit of the use of a 5-ton roller. The latter continued the rolling until the pavement ceased to show any marking as the roller passed over it. Portions of the pavement inaccessible to the rollers were tamped by hand.

Special pains were taken to secure good materials. Rock that was free from clay or soft, flat pieces was screened to pass a ¾-in. screen and be retained on a ½-in. screen. The screenings were material of the same kind that passed a ½-in. screen, with particles of as near uniform variation as possible. The stone dust consisted of material all of which would pass a 50-mesh screen and 60 per cent of which would go through a 200-mesh screen. Solid refined California asphalt was the material specified for the preparation of the asphaltic cement.

The first pavement of this kind was laid in May, 1910, on a wharf 200 ft. long and 50 ft. wide. In 1911 an additional area of 28,000 sq. ft. was covered in the same manner. The service has been satisfactory, meeting with favor on the part of the shippers, and the floor shows little evidence of wear at the present time. The use of a 2-in. thickness in place of 3 in. was discussed at the time that these floors were being laid, but owing to the fact the wharfs are subjected to very heavy truck loads of lumber it was considered that better results would be obtained with the application of a 3-in. thickness.

Reducing Settlement in New Embankments

SPECIAL measures are being taken on track elevation work which is being carried on by the Chicago, Rock Island & Pacific at Chicago, to minimize as far as practicable the long-continuing settlement which ordinarily occurs in embankments after the superimposed tracks have been placed in service. Such periods of solidification materially increase maintenance expenditures. It is sometimes found necessary to delay the placing of all the permanent ballast until the initial settlement has been completed to avoid the addition of excessive amounts of ballast, although this not only adds to the cost, but effects both rails and ties unduly. The problem is especially serious in track elevation work, where limitations as to right of way ordinarily make it imperative to turn the new embankment into service as soon as it has been filled to full height. The difficulties which this brings about under ordinary procedure have been largely reduced on the Rock Island by the special methods put into effect.

The track elevation work which this road has had in progress for the last four years in Chicago involves some

THE TRACK BEFORE PLACING THE FINE BALLAST

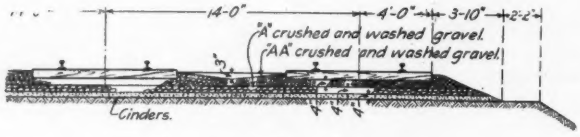
embankments 35 ft. high, for which a filling material is used that will settle as much as 2 ft. in embankments of ordinary height under the usual methods of placing. In an effort to avoid the difficulties enumerated above, studies were made to determine what could be done to concentrate the solidification so that it could be largely completed in a few weeks and before the tracks were put in service. Studies were also made to determine upon a type of ballast that would be especially suited to distributing the train loading through the new embankment.

VIEW OF THE FINISHED TRACK

The compacting and settling of the embankment has been accomplished by soaking it with water while the material was being unloaded. The presence of retaining walls on both sides of this work for practically its entire length made it an easy matter to lay pipe lines along the tops of the walls from which water could be drawn as required. The thorough saturation of the material which this required was anticipated in the back filling of these retaining walls by providing 6-in. vitrified pipe lines with open joints on a ledge along the back faces of the walls and covered with large cobblestones. The effectiveness of this construction was demonstrated by the large amount of water delivered from these drains.

The ballast consists of 12 in. of specially-prepared crushed and washed gravel placed on a sub-ballast of cinders. The crushed gravel is obtained from the plant of the Chicago Gravel Company near Joliet, Ill., which is furnishing the road with a large proportion of the ballast being placed in Illinois and eastern Iowa. The material used on the track elevation, however, differs to a

considerable extent from that used in the regular ballast renewals. The latter consists essentially of a pit-run gravel, crushed and screened to remove pieces rejected by a 2½-in. screen and passing a ¼-in. screen, although a considerable quantity of sand is added. The washing is done during the process of screening. The track elevation ballast on the other hand involves a reversal of the process. The gravel is washed before being crushed with the further refinement that only pieces large enough to be held on a 2-in. screen shall go into the crusher. The product of the crusher is divided into two grades, "A" and "AA." The former comprises all particles passing



STANDARD CROSS SECTION

a 3-in. screen and retained on a 1½-in. screen; the latter, all material passing a 1¾-in. screen and held on a ¼-in. screen.

The cinder sub-ballast is placed first to a depth of 4 in., substantially in the manner suggested by the Committee on Ballast of the American Railway Engineering Association in 1914. The track is then raised on this and placed in service for a short time, the exact interval depending more on convenience in prosecuting the work than any effort to secure a definite duration of time. The cinder sub-ballast is then covered by 8 in. of the "A" or coarse rock. The track is raised on this and later receives 4 in. of the "AA" or finer ballast. One of the accompanying photographs shows the track in service on the coarse rock. The cinder sub-ballast can be seen to the left beyond the ends of the ties. The other picture shows the track as finally surfaced and lined on the top ballast. The track is new throughout. Six-inch by eight-inch bored creosoted gum ties are used with tie plates and screw spikes. The rail is 100-lb. A. R. A. section type A.

The service the track has given has fully justified the special methods. An average of 2 in. of settlement took place in the first six months that the track was in service, but there has been practically no subsequent settlement. Judging from the experience thus far, the maintenance expenses on this piece of track will be very low for several years, as there will be an entire absence of the heavy labor charges for surfacing and lining, which almost invariably offset the low charge for renewals on new track. This work is under the direction of C. A. Morse, chief engineer of the Rock Island, and R. H. Ford, engineer of track elevation.

THE ROADMASTERS' CONVENTION

M. BURKE, president of the Roadmasters' and Maintenance of Way Association, has issued a statement to the members relative to the next convention of this association, scheduled to convene in Chicago on September 18. Because of the central location of Chicago, it has been decided by the executive committee that the time of the convention will be cut down to two days, all of which will be utilized for routine business of the convention, including the discussion of reports and papers, the election of officers, etc. All entertainment features, such as banquets and excursions, will be eliminated and the entire two days, including an evening session if necessary, will be devoted strictly to business.

THE MATERIAL MARKET

A RECORD of the material market during these unusual times calls for the use of so much superlative language that it becomes monotonous. Each month brings records of prices more remarkable than the last and with the price of pig iron, the index of all iron and steel prices, advancing at the rate of $1 per day, with all classes of scrap mounting to almost unbelievable heights and with the market definitely closed for not a few products, it is futile to hazard when the limit will be reached. Just at present the scrap market presents the most interesting aspect. The tables below are representative of the prices of several common items of maintenance of way scrap together with two items of car scrap that are commonly picked up by the track forces:

Item	Price Per Gross Ton
Frog and switch scrap	$35.00 to $40.00
Scrap rail, 3 ft. or less in length	38.00 to 40.00
	Price Per Net Ton
Angle bars	$33.00 to $37.00
Pipes and flues	24.00 to 26.50
Knuckles and couplers	33.00 to 39.00
Car springs	33.00 to 40.00

Turning now to usable second-hand rails, we find that released rails suitable for rerolling are bringing from $40 to $48 per gross ton, while relaying rail subject to inspection brings from $42 to $51 per ton with one quotation of $55 to $60. No more conclusive evidence of the rail famine could be had. The Canadian railways which have been laboring under a most severe shortage of rail have secured authorization through the Imperial Munitions Board for the rolling of 50,000 tons of standard rails by the Algoma Steel Corporation, the plants of which are otherwise engaged on munitions work. As far as American railways are concerned there is no market for new rails at the present time.

Very little auxiliary track material has been purchased in recent weeks and no changes of any importance have taken place in the prices, except in track spikes which have advanced from $4 to $4.50 per keg at Pittsburgh, but remain at $4.15 in Chicago. Track bolts cost $5 and up per keg, angle bars are 3.25 cents per lb. and tie plates are $60 or more per ton. Another advance of $3 per ton, followed by one of $2, has raised the price of cast iron pipe to the high figure of $60.50 per ton in 6 in. diameter or larger.

A few of the railroads are still placing miscellaneous contracts for structural steel. The Pennsylvania Railroad has again placed an order for bridge work, this time aggregating 700 tons. The Chicago & North Western ordered steel for a new boiler shop amounting to about 300 tons.

Building materials other than steel are in an uncertain state just at present. The shortage of labor and the high prices of hardware has cut down building operations, which have also been affected by the feeling of uncertainty arising from the entrance of the country into the war. Concrete materials have also been affected by agitation from certain circles for a reduction in road and building programs during the period of hostilities and although this attitude has been largely overcome, there has been no little reduction in the demand. The prices remain firm, however. The advances of $5 to $8 in the price of lumber during the last two months are apparently established without any difficulty. In all of these lines, including cement, stone, gravel and lumber, there are continued complaints of car shortage. The stone quarries and gravel pits have suffered severely because of the preference given to coal and ore traffic in the distribution of open top cars, although this situation has been ameliorated to a certain extent.

GENERAL NEWS DEPARTMENT

THE DELAWARE, LACKAWANNA & WESTERN has advanced the pay of several thousand employees, largely clerks, at rates varying from five to ten per cent. In the case of large numbers the rate of increase is six per cent.

THE AMERICAN RAILWAY ASSOCIATION reported on June 1 that the net shortage of freight cars was 105,127 cars, or 43,500 less than the shortage of May 1. This is a decrease of almost one-third in thirty days.

THE CANADIAN PACIFIC has announced that it will allow all employees who enlist in the United States Army or Navy, six months' salary, payable monthly, provided they cross the sea, and that on their return they will be given their former or similar positions.

THE KENTUCKY COURT OF APPEALS holds that a man whose regular employment was working on track replacing old rails with new, etc., but who at the time of his injury was loading old rails lying on the right-of-way, was not, at that time, engaged in interstate commerce.

THE ATLANTIC COAST LINE has made increases in pay ranging from 8 to 12 per cent for substantially all classes of employees except those belonging to unions, with which formal agreements have been made, and also excepting employees who have had their pay raised since the beginning of 1917.

THE DEPARTMENT OF THE INTERIOR at Washington has announced that the government is to buy the Tanana Valley railroad in Alaska. This road extends from Fairbanks northward to Chatanika, a distance of about 20 miles, with a short branch. A small section of this road will be used by the government line to reach Fairbanks, the northern terminus of the railroad now being built by the government.

THE MAINTENANCE OF WAY MASTER PAINTERS' ASSOCIATION had the misfortune to lose the entire issue of its proceedings for 1916 while they were in transit from the publishers to the secretary. As the association is not in a position to finance a reprinting, it is unable to supply its members and friends with an account of the transactions of its convention in Philadelphia last October. A report of this convention appeared in the *Railway Maintenance Engineer* for December, 1916, page 381.

THE CIRCUIT COURT OF APPEALS, Third Circuit, held in a recent decision that a railroad carpenter who had been sent to repair a chute which supplied coal to engines engaged in both interstate and intrastate commerce, and who after waiting a time at the yardmaster's office to get a car of lumber shifted to the chute started to walk toward the chute was run over by the lumber car while it was being moved by a work train, could not recover for his injuries under the federal employers' liability act.

THE IMPERIAL MUNITIONS BOARD OF CANADA has authorized the Algoma Steel Corporation and the Dominion Steel Corporation to roll 50,000 tons of standard section rails for Canadian railroads, partially to replace the rails turned over to the Dominion Government for export to the war zone. These roads were unable to secure new rails from American mills. The Canadian rails will be distributed between the Canadian Pacific, the Government Railways, the Grand Trunk and the Temiskaming & Northern Ontario.

THE NASHVILLE, CHATTANOOGA & ST. LOUIS is not only urging its employees to grow their own vegetables, but is buying such seeds as are needed for the planting of community gardens, in addition to tendering the use of its right-of-way for cultivation. Recently a number of the section gangs have gone in for community gardens, the road having agreed to allow them to plant such gardens on company time and to furnish the necessary seed. The men will pool their interests for supplying their tables this summer. These community gardens are in addition to the individual gardens already planted under the company's first offer for use of the right-of-way. The company in addition has turned over its 12 demonstration farms for the production of food crops.

THE CHICAGO & ALTON has granted an increase in pay of 25 cents a day to all section men employed in the Chicago terminal district and between Joliet and Chicago. The men formerly receiving $2 a day now receive $2.25. On a large proportion of the lines east of St. Louis increases from $1.90 a day to $2 a day were also granted, which went into effect June first.

THE DENVER & RIO GRANDE has announced, through its president, H. U. Mudge, that beginning July 1 the company will retire all employees at the age of 70 years and will pay pensions to these employees based on the average monthly pay for ten years previous to retirement. Each employee retired will receive one per cent of this average pay for each year in the service. The pension applies to all persons, both officers and employees, who have been in continuous service with the company for 25 years or more.

THE CHICAGO, BURLINGTON & QUINCY, through its relief department, spent $586,474 in benefits to members during the year ending December 31, 1916. During the year 5,331 members were reported disabled on account of sickness, of whom 4,765 recovered, 182 died and the remainder were still under care at the end of the year; 6,417 cases of disability on account of accident were reported, of which 68 resulted fatally. The membership in the relief fund was 28,322 at the end of 1916, a net gain of 2,428 over the previous year.

THE CHICAGO & NORTHWESTERN, through R. C. Richards chairman of its central safety committee, has addressed a safety bulletin to all employees asking them to advise of every unsafe condition or practice which comes within their observation, and calls attention to the fact that printed postcards are furnished for the purpose of sending in suggestions. From January 1, 1912, to December 31, 1916, five years, 25,183 recommendations were made on "safety' postal cards, or otherwise, and all but 1,019 of them were adopted and put into effect.

THE NEW YORK STATE PUBLIC SERVICE COMMISSION, First district, New York City, proposes to issue an order requiring gates at highway grade crossings to be kept lowered constantly from midnight to 5:30 a. m., except when raised to permit an automobile, a carriage or a wagon to pass. A hearing was held on June 6 on this matter. The purpose of this order is to provide additional safety for automobiles by making it necessary for every such vehicle to be brought to a full stop at each crossing, and also to keep the attendant alert. Complaint has been made to the commission that crossing attendants frequently fall asleep during the night.

THE SOUTHERN PACIFIC is now engaged in moving approximately 1,000 tons of records from the city freight terminal to a three-story fireproof building at Mission and Spear streets, San Francisco. The number of tons of records being moved gives some idea of the volume of clerical business done in the necessary conduct of the affairs of a large railroad. F. W. Pope, auditor of freight accounts of the Southern Pacific, is alone responsible for 400 tons of files. His department turns out 1,100 bound books and bundles monthly. The California Railroad Commission requires that all documentary matter relating to transportation be preserved for a certain length of time, and some of it indefinitely.

THE NEW YORK LEGISLATURE has put a stop to the building of the proposed railroad bridge across the Hudson river at Castleton, ten miles south of Albany, a bill having been passed by the legislature and signed by the governor requiring the bridge to be built with a single span. Such a bridge would cost several million dollars more than one of two spans, and the railroad company is understood to have declared the cost of a single span prohibitive. The War Department had approved the two-span bridge, but the law passed at Albany is understood to have been carried through by business interests in that city, which are said to fear that the pier, set between the two channels, as would be necessary for the two-span bridge, would work an injury to the commerce of Albany.

PERSONAL MENTION

GENERAL

D. M. Driscoll, roadmaster on the Northern Pacific at Duluth, Minn., was appointed trainmaster on the Lake Superior division, with the same headquarters, effective June 5.

C. B. Brown, chief engineer of the Canadian Government Railways at Moncton, N. B., has also been appointed assistant general manager of the Eastern Lines, with the same headquarters.

J. F. Gagnon, superintendent of maintenance of way on the Ft. Dodge, Des Moines & Southern, at Boone, Ia., has been appointed superintendent of terminals, with headquarters at Ft. Dodge, succeeding J. A. Combs, effective June 15.

M. W. Clement, division engineer in the office of the principal assistant engineer of the New Jersey division of the Pennsylvania Railroad, has been promoted to superintendent of the New York, Philadelphia & Norfolk, with headquarters at Cape Charles City Va., succeeding C. I. Leiper, promoted.

H. E. Astley, who has been appointed superintendent of the Midland division of the New York, New Haven & Hartford, with headquarters at Boston, Mass., began railway work in 1889, as a rodman on the Pennsylvania Railroad. In 1894 he went to the New Haven, and served successively as assistant roadmaster, roadmaster and supervisor. He was appointed trainmaster of the Midland division of the New Haven in March, 1916, which position he held at the time of his recent appointment.

Louis C. Fritch, general manager of the eastern lines of the Canadian Northern, who has been appointed general manager of the Seaboard Air Line, with headquarters at Norfolk, Va., is an engineer by training and is a past-president of the American Railway Engineering Association. Mr. Fritch was born in Springfield, Ill., in 1868, and took a course in civil engineering at the University of Cincinnati. Later he studied law and was admitted to the bar in Ohio. He entered railway service in 1884 as supervisors' assistant on the Ohio & Mississippi and had a rather varied experience on a number of railroads, becoming assistant general manager of the Illinois Central at Chicago in March, 1905, and later assistant to the president, and then consulting engineer. He was next appointed chief engineer of the Chicago Great Western, and in March, 1914, he was appointed assistant to the president of the Canadian Northern. In August, 1915, he was appointed general manager of the lines east, which position he held until his recent appointment as noted above.

ENGINEERING

E. H. May, assistant division engineer of the Pennsylvania Lines at Logansport, Ind., has been transferred to Fort Wayne, succeeding H. T. Sympson, transferred.

L. C. Ayers, assistant superintendent in charge of maintenance of way and structures on the Norfolk & Western at Bluefield, W. Va., has been transferred to the Norfolk division, with office at Crewe, Va.

H. T. Whitney has been appointed assistant division engineer of the Michigan division of the Pittsburgh, Cincinnati, Chicago & St. Louis, with headquarters at Logansport, Ind., succeeding E. H. May, transfered, effective June 1.

H. T. Ruhl, division engineer, Canadian Government Railways at Moncton, N. B., has been appointed to the newly created position of engineer maintenance of way and structures on the Delaware & Hudson, with headquarters at Albany, N. Y.

Lewis H. Bond, roadmaster on the Illinois Central at Carbondale, Ill., has been appointed assistant engineer maintenance of way, with headquarters at Chicago, succeeding W. G. Arn, who has received a commission in the Chicago railway regiment, the Third Reserve Engineers.

Charles G. Stewart, who was recently appointed assistant engineer on the Baltimore & Ohio, with headquarters at Cincinnati, Ohio, was born in Hockingport, on November 28, 1885. After leaving high school he entered Ohio University, graduating with the degree of bachelor of science in 1910, and in 1912 he received a degree in civil engineering at Cornell University. He entered railway service as an assistant in the engineering corps of the Pennsylvania, at Cleveland in October of the latter year. On November 6, 1916, he went with the Baltimore & Ohio as assistant supervisor at Walkerton, Ind., which position he held until his promotion, on May 19.

J. S. Lemond, whose appointment as assistant to the chief engineer maintenance of way and structures of the Southern, Lines East, with headquarters at Charlotte, N. C., was announced in these columns last month, began railway work as a section foreman of the Southern in April, 1883. He has since been constantly in the employ of this road, serving 3 years as a section foreman, 1 year and 5 months as a work-train conductor, 2 years 9 months as a track supervisor, 14 years 9 months as roadmaster, 1 year 3 months as superintendent of track, bridges and buildings and 10 years and 6 months as engineer maintenance of way. The position is a new one.

J. L. Earls, whose appointment as division engineer on the Nashville, Chattanooga & St. Louis, with headquarters at Tallahoma, Tenn., was announced in these columns last month, entered railway service in July, 1889, in the bridge and building department of the Nashville, Chattanooga & St. Louis. In 1896 he was promoted to foreman of a bridge gang on the Huntsville division, and two years later was transferred to the Chattanooga division. In 1902 he was appointed supervisor of bridges and buildings on the Huntsville division, and was later transferred to the Chattanooga division, which position he held until his recent appointment as division engineer and supervisor of bridges and buildings.

George A. De More, supervisor on the New Haven division of the New York, New Haven & Hartford at New Haven, Conn., who has been appointed division engineer on the Hartford division, as noted elsewhere, was born in 1866 and was educated in the public and high schools of Millbrook, N. Y. He entered railway service in 1882 as a trackman on the New Haven and in 1885 he was advanced to section foreman. In 1888 he was made construction foreman and was engaged in rebuilding the Harlem River (N. Y.) terminal. From 1893 to 1900 he served as assistant roadmaster and was engaged in the four-tracking work from New Haven, Conn., to Woodlawn, N. Y. In 1900 he was promoted to roadmaster of the Shore Line division, remaining in that capacity until 1915, when he was made supervisor on the New Haven division as noted above.

J. H. Reinholdt whose appointment as chief engineer of the Minneapolis & St. Louis was announced in the last issue, was born at Manning, Iowa, on November 23, 1883, and graduated from the engineering department of Lafayette College, Easton, Pa., in 1906. From 1901 to March, 1903, he was rodman on construction for the Chicago Great Western, and the following six months he was with the New York Central Lines on location work in western Pennsylvania. From the latter date until 1906 he was in college, and was then for one year with the Easton Transit Company as assistant engineer. From June, 1907, to April, 1909, he was with the Lehigh Valley as assistant engineer and roadmaster. He then went with the Minneapolis & St. Louis and was successively assistant engineer, roadmaster and principal assistant engineer until February of this year, when he became roadmaster for the Kansas City Terminal Railway, from which road he now returns to the Minneapolis & St. Louis as chief engineer.

C. F. Yardley, division engineer maintenance of way of the Hartford division of the New York, New Haven & Hartford, with office at Hartford, Conn., has been appointed maintenance engineer of the New York division, with headquarters at Harlem River, N. Y., in connection with the reorganization plan mentioned in these columns last month. G. A. DeMore, track supervisor at New Haven, Conn., has been promoted to division engineer, succeeding Mr. Yardley. R. L. Pearson, division engineer maintenance of way of the New London division at New London, Conn., has been transferred to Providence, R. I., as

division engineer of the Providence division, succeeding W. D. Warren. whose appointment as maintenance engineer of the lines east, with headquarters at Boston, Mass., was also mentioned in these columns last month. R. J. Bieth, track supervisor at South Braintree, Mass., has been promoted to division engineer at New London, succeeding Mr. Pearson. J. W. Pearson, division engineer maintenance of way of the Old Colony division at Taunton, Mass., has been transferred to Boston Mass., as division engineer of the Boston division. S. A. Kinzie, track supervisor at Framingham, Mass., has been promoted to division engineer, succeeding Mr. Pearson.

R. J. BIETH, track supervisor on the Boston division of the New York, New Haven & Hartford, at South Braintree, Mass., who has been promoted to division engineer of the New London division, with headquarters at New London, Conn., was educated at Cooper Union, graduating in 1904 and receiving the degree of C. E. in 1911. Later he completed a specialized structural course at Columbia University. He began railway work in 1904 as chainman in the engineering department of the New York Central and was placed from time to time in responsible charge of general surveys for grade revision, alinement changes and new lines. He served later in the construction department in connection with the four-tracking in the vicinity of New York and in the designing office, principally on the Hastings improvements. In 1909 and 1910 he was with the New York Public Service Commission as draftsman on subway construction in Brooklyn. In 1910 he entered the employ of the New York, New Haven & Hartford as assistant engineer of the New York division, which position he held until 1916, when he was appointed supervisor on the Boston division.

THOS. J. WILLIAMS, JR., whose appointment as division engineer of the St. Louis Southwestern, with headquarters at Mt. Pleasant, Tex., was announced in the last issue, was born at Church Hill, Trumbull County, Ohio, on October 14, 1880. He graduated from the Ohio Northern University, Ada, Ohio, in 1900, and began railway work in November of that year with the Pennsylvania Lines as rodman on preliminary and location surveys. From March, 1901, to October, 1903, he engaged in private practice as a mining engineer in Ohio and Pennsylvania. The following six months he was assistant engineer in charge of location from Baton Rouge, La., to New Orleans, for the Louisiana Railway & Navigation Company. He was then mining engineer at Terre Haute, Ind., until October, 1904, when he went with the Oregon Short Line as instrument man in charge of a residency of the Minadoka Southwestern. From March, 1905, to September, 1910, he was successively resident engineer on the Orrville-Bolivar cut-off and assistant engineer on maintenance for the Wheeling & Lake Erie at Canton, Ohio. On the latter date he became office engineer for the Louisiana Railway & Navigation Company at Shreveport, La., which position he held until his recent appointment to the newly created position of division engineer of the Middle division of the St. Louis Southwestern.

H. R. GIBSON, division engineer of the Baltimore & Ohio, western lines, at Seymour, Ind., has been appointed district engineer maintenance of way, with headquarters at Cincinnati, Ohio, and A. H. Freygang, assistant engineer in the office of engineer maintenance of way, succeeds Mr. Gibson. R. W. Gabriel, assistant engineer in the office of the district engineer maintenance of way of the Baltimore & Ohio Southwestern, has been promoted to assistant engineer in the office of the engineer maintenance of way of the Baltimore & Ohio, western lines, at Cincinnati. A. M. Davidson, assistant division engineer of the Cincinnati, Hamilton & Dayton, at Dayton, has been appointed assistant engineer in the office of the district engineer maintenance of way of the Baltimore & Ohio Southwestern, at Cincinnati. C. G. Stewart, assistant supervisor of the Baltimore & Ohio, western lines, at Walkerton, Ind., has been promoted to assistant engineer in the office of the district engineer maintenance of way of the Baltimore & Ohio Southwestern at Cincinnati. W. P. Ball, district bridge inspector of the northwest district of the Baltimore & Ohio, western lines, and the Cincinnati, Hamilton & Dayton, has been promoted to assistant division engineer of the latter road, with office at Dayton. F. J. Kahle, transitman in the office of the district engineer maintenance of way of the Baltimore & Ohio Southwestern at Cincinnati, has been promoted to district bridge inspector of the Northwest district and the Cincinnati, Hamilton & Dayton at Cincinnati. M. D. Carothers has been appointed assistant supervisor of the Baltimore & Ohio, western lines, at Walkerton, Ind.

TRACK

J. H. WELSHINGER has been appointed roadmaster on the Lake Superior division of the Northern Pacific, with headquarters at Duluth. Minn., effective June 6.

W. W. PRATER, section foreman on the Clinton, Davenport & Muscatine at Davenport, Ia., has been promoted to roadmaster, with headquarters at the same place.

L. T. WALLIN has been appointed roadmaster on the Plainview and Floyada districts of the Atchison, Topeka & Santa Fe, succeeding G. C. Jeffries, promoted. Effective June 16.

JOHN A. TRAINER, roadmaster on the Chicago, Rock Island & Pacific, at Haileyville, Okla., has been transferred to the St. Louis division, with headquarters at Eldon, Mo., succeeding N. T. Blackwell, assigned to other duties.

M. L. HARE, bridge and building inspector on the Northern Pacific, has been appointed assistant roadmaster on the James River and Oakes branches, the Wilton branch and the Devils Lake branch south of Carrington.

H. M. GRIMM has been appointed supervisor on the Tyrone division of the Pennsylvania at Osceola Mills, Pa., succeeding G. C. Smith, transferred to the West Jersey & Seashore railroad at Millville, N. J. J. C. White has been appointed assistant supervisor on the Tyrone division, succeeding J. V. Gibney, resigned.

C. E. DOUBLE, announcement of whose appointment as roadmaster on the Chicago, Burlington & Quincy, with headquarters at Burlington, Iowa, was made in the last issue, was born at Albia, Iowa, on March 7, 1880. He entered railway service with the C. B. & Q. as an extra section laborer and in 1899 was placed in charge of a section gang at Lockridge, Ia. He served as foreman of various section gangs until his promotion on April 25.

G. W. MORROW, track supervisor on the Northampton division of the New York, New Haven & Hartford, has been transferred to the New Haven division. Mr. Morrow began his railroad work in 1904 as timekeeper and assistant foreman in the maintenance of way department of the New Haven. In 1907 he was appointed foreman of section and extra gangs on the New York division and was made general foreman on that division in 1910. He was promoted to track supervisor of the Northampton division in November, 1916.

CHARLES KRATOSKA, announcement of whose appointment as roadmaster on the Chicago & North Western at Eagle Grove, Iowa, was made in the last issue, was born at Chelsea, Iowa, on December 19, 1880. He entered railway service with the North Western on October 10, 1897, as section laborer. In May, 1901, he became extra gang foreman. He served as foreman of various track gangs until 1912, when he was promoted to carpenter and bridge foreman on the Iowa & Minnesota division, which position he held until his recent appointment.

WILLIAM E. RUSSELL, track supervisor on the St. Louis division of the Illinois Central, at Carbondale, Ill., was appointed roadmaster at Clinton, effective June 1. He was born at Pennville, Ind., and graduated in civil engineering from Purdue University in 1905. He entered railway service in the fall of that year in the engineering department of the Illinois Central and was later promoted to masonry inspector. On August 1, 1915, he was appointed track supervisor, and was employed in this capacity until his recent appointment as roadmaster.

RICHARD HUGHES, assistant roadmaster on the Montana division of the Great Northern, with headquarters at Havre, Mont., has been appointed roadmaster of a newly created division, with headquarters at the same point, and S. E. Coleman, carpenter foreman on the Cascade division, has been appointed master carpenter on the new division. J. M. Sullivan succeeds Mr. Hughes as assistant roadmaster, with headquarters at Pacific Junction, Mont. C. A. Nunes has been appointed assist-

ant roadmaster on the first district of the Butte division, with headquarters at Great Falls, Mont., vice C. T. Christianson, resigned.

H. F. FIFIELD has been appointed track supervisor on the Hartford division of the New York, New Haven & Hartford, with headquarters at Hartford, Conn., in connection with the recent reorganization noted in these columns last month. Other supervisors appointed include T. Londregan on the New London division at New London, G. W. Morrow on the New Haven division, C. S. Flandreaux on the Providence division, E. E. Oviatt on the Boston division, J. A. McIsaac on the Old Colony division, with headquarters at Framingham, Mass., and H. P. Spencer on the same division, with headquarters at Taunton.

E. E. OVIATT, assistant engineer on the Midland division of the New York, New Haven & Hartford, with office at Boston, Mass., has been promoted to track supervisor on the Boston division, with headquarters at South Braintree, Mass., succeeding R. J. Bieth, promoted. Mr. Oviatt was educated at Sheffield Scientific School, Yale University, graduating in the class of 1913. He entered the service of the New Haven in September, 1913, as a rodman in the office of the division engineer of the Western division, at Waterbury, Conn. He later served successively as inspector and transitman, and in May, 1915, he was made assistant engineer in the valuation department, with office at New Haven, Conn. In March, 1916, he was transferred to Boston as assistant engineer on the Midland division, and, effective May 20, 1917, he was promoted to track supervisor, as noted above.

GEORGE M. O'ROURKE, assistant engineer on the Illinois Central, at Carbondale, Ill., has been appointed track supervisor, with the same headquarters. He was born at Chicago on February 22, 1889, and received his engineering education at Armour Institute of Technology. He began railroad work on March 1, 1906, as a chainman in the engineering department of the Illinois Central and has been continuously in the service of that company since that time. In January, 1907, he was promoted to draftsman and in 1909 he became junior masonry inspector. One year later he was promoted to instrumentman, and in 1910 he was appointed masonry inspector. From this latter date he served consecutively as resident engineer from 1911 to 1913; chief draftsman in the valuation department to 1915, and assistant engineer, which position he held until his recent appointment as track supervisor, succeeding W. E. Russell, promoted.

C. S. FLANDREAUX, assistant engineer on the Providence division of the New York, New Haven & Hartford, has been appointed track supervisor on that division, with office at Providence, R. I., succeeding A. L. Bartlett, who has been granted a leave of absence. Mr. Flandreaux was educated at New York University and graduated from the civil engineering course in 1903. He began railway work in June of that year as a rodman for the New Haven at New Haven, Conn., and in November, 1904, he resigned to accept a position as assistant engineer for the city of New Rochelle, N. Y. He returned to the New Haven as a rodman in February, 1911, and was advanced to the grade of inspector in October, 1911. In August, 1912, he was transferred to the construction department as transitman on the four-track work between Readville, Mass., and East Junction. In June, 1913, he was transferred to Harlem River, N. Y., and in February, 1915, he was appointed assistant engineer of the Providence division, as noted above.

BRIDGE

J. E. BERNHARDT, assistant engineer on the Chicago & Eastern Illinois, with headquarters at Chicago, Ill., has been appointed bridge engineer, with the same headquarters. Mr. Bernhardt was born in Terre Haute, Ind., on May 11, 1887. He graduated from Rose Polytechnic Institute in 1908, and he entered railway service with the Pittsburgh, Cincinnati, Chicago & St. Louis in the summer of 1906. From June, 1908, to January, 1909, he was in the employ of Libby & Nelson, contractors, at Minneapolis, Minn. In January, 1909, he returned to the Panhandle, and in July of the same year was mining engineer at Big Stone Gap, Va. In April, 1910, he entered the bridge department of the Chicago, Milwaukee & St. Paul, at Chicago, going to the Chicago & Eastern Illinois in September, 1910, as draftsman, where he became successively chief draftsman and assistant engineer in charge of bridges, and finally bridge engineer, as noted above.

PURCHASING

W. J. HINER, assistant purchasing agent of the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed purchasing agent at Cincinnati, Ohio, succeeding George Tozzer, retired.

OBITUARY

CHARLES SUMNER HALL, engineer of track elevation of the Chicago & North Western, died at Evanston, Ill., on June 15. He was associated with the engineering department of that road for 40 years, serving in turn as locating engineer, division engineer, etc. He devoted 12 years to the position he held at the time of his death.

GEORGE W. CREIGHTON, general superintendent of the Eastern Pennsylvania division of the Pennsylvania Railroad at Altoona, Pa., who died on June 3, received a large part of his railway training in engineering and maintenance work. He was born at Philadelphia on June 22, 1856, and began railway work in January, 1878, as a rodman on the engineering corps of the Madeira & Mamore Railway in Brazil. In October, 1879, he entered the service of the Pennsylvania Railroad as a rodman. He remained in continuous service with the Pennsylvania, advancing to track supervisor and later to division superintendent. In April, 1907, he was made general superintendent of the Eastern Pennsylvania division, which position he held at the time of his death.

JUDSON C. CLEMENTS, who on March 17 completed 25 years of service as a member of the Interstate Commerce Commission, died suddenly on June 18 at his home in Washington. He was born in Walker county, Georgia, in 1846. He studied law at Cumberland University, Lebanon, Tenn., and was admitted to the bar in 1869. After practicing law at Lafayette, Ga., for 11 years he removed to Rome, Ga., where he was county commissioner in 1871 and a member of the Georgia legislature from 1872 to 1880. From 1881 to 1891 he was a congressman from Georgia, and for a year he had been president of the Chattanooga, Rome & Columbus. His appointment to the Interstate Commerce Commission followed his retirement from Congress. When but 16 years of age he had enlisted in the Confederate army at the outbreak of the Civil war, and at the close of hostilities he retired as a first lieutenant.

IN MILITARY SERVICE

P. J. WATSON, JR., assistant engineer of the Chicago & Alton at Bloomington, Ill., has been granted an indefinite leave of absence to enter the officers' reserve training camp at Ft. Sheridan, Ill.

G. H. WEBB, chief engineer of the Michigan Central, has been recommended for lieutenant-colonel in the Sixth Railway regiment, a construction regiment, with headquarters at Detroit, Mich.

JOE RODMAN, track foreman on the Pacific Electric at Los Angeles, has received an appointment as construction superintendent and has sailed for France with the first contingent of the engineering corps to reconstruct and operate certain portions of the French railways.

A. L. BARTLETT, track supervisor of the New York, New Haven & Hartford, was called to active service on May 1 as a member of the Rhode Island State Militia. R. M. Lawton, construction engineer, left the service on May 15 to serve in the Engineering regiment at Plattsburg, N. Y.

F. E. LAMPHERE, assistant engineer in charge of construction on the Baltimore & Ohio Chicago Terminal at Chicago, has received a commission as major in the United States army and has been assigned to Louisville, Ky., to take charge of the construction of the training camp.

W. S. EMLEY, assistant engineer of the Gulf, Colorado & Santa Fe, was called into army service on May 9, as first lieutenant in the Officers' Reserve Corps, United States army, at Leon Springs, Tex. G. A. Knapp, office engineer, was called into service on May 16 as a captain in the Officers' Reserve Corps, with headquarters at Leon Springs, Tex. James Vawter, assistant engineer, left railway service on May 16 to enter the Officers' Reserve Corps at Leon Springs, Tex., as a first lieutenant. R. E. Butcher, assistant engineer, entered the United States navy on May 16, with the rank of ensign.

CONSTRUCTION NEWS

THE AMARGOSSA VALLEY was recently incorporated to build a railroad 16.21 miles long through Salt Basin in San Bernardino county, from a point on the Tonopah & Tidewater Railroad, 69 miles north of Ludlow, to the plant of the Avawatz Salt & Gypsum Company, on the north slope of the Avawatz mountains.

THE ATCHISON, TOPEKA & SANTA FE has completed plans for an employees' clubhouse at Shopton, Ia., which will cost about $40,000. The building will be two stories high, 36 ft. by 123 ft. of brick veneer, with tile and tar and gravel roof and will have sleeping porches and shower baths.

This company is also making plans to build a storage and unclaimed freight building at Topeka, Kan., which will be three stories high, 102 ft. by 262 ft., of reinforced concrete, with brick face, and will be equipped with elevators. The approximate cost is $250,000.

This road is building a line from Sumpter, Okla., to a point about 10 miles northeast. A branch line from Porterville, Cal., to Ducor, a distance of about 10 miles, is also under construction, and will connect with the Ducor-Pond line, a small subsidiary of the Southern Pacific.

THE ATLANTA, BIRMINGHAM & ATLANTIC has announced that it will extend its line from Waycross, Ga., to Jacksonville, Fla., a distance of about 75 miles. A large terminal site has been bought in the center of Waycross and arrangements have been made for terminal property at Jacksonville.

THE BALTIMORE & OHIO has awarded a contract to the J. Toner Barr, Pittsburgh, Pa., for work on a five-mile branch from Flemington, W. Va., to mines on Simpsons' Creek. The work involves handling about 30,000 cu. yd. to the mile. The maximum grade will be 1 per cent and the maximum curvature 12 deg.

This road will construct a power plant for its engine terminals at Garrett, Ind. The building will be 80 ft. long, 71 ft. wide and about 26 ft. high.

THE BARTON COUNTY & SANTA FE has awarded a contract to John Scott & Sons, St. Louis, Mo., to grade a line from Holyrood, Kan., to Galatia, and work will be started at once. The line runs through a fairly level country and there are no special engineering difficulties to be overcome.

THE CHICAGO & NORTH WESTERN has completed preliminary plans for an eight-mile connecting line between the Madison (Wis.) and Sparta lines, east of West Allis (Milwaukee). Construction will not be started this year.

This company will build a tank shop at Chicago, Ill., 80 by 106 ft., of brick construction, with a steel frame. These improvements are in addition to others, involving a total expenditure of approximately $900,000.

THE CHICAGO, BURLINGTON & QUINCY has awarded a contract to the Van Sant Construction Company, Kansas City, Mo., for the construction of a one-story brick freight house, 32 ft. by 506 ft., at Kansas City, Mo.

THE CHICAGO, MILWAUKEE & ST. PAUL has completed surveys for a line between New England, N. D., and Amidon. Construction work will not be started until after the conclusion of the war.

THE CLEAR LAKE RAILROAD is a new company which has been organized recently to build a line from Hopland, Cal., to Lakeport, a distance of about 24 miles. The underwriting of the bonds has been practically completed and the contract for the work has been awarded to Guy L. Hardison, engineer-contractor, San Francisco, Cal.

THE GREAT NORTHERN has awarded a contract to Grant, Smith & Co., St. Paul, Minn., for an engine terminal at Bowdoin, Mont., which will cost approximately $300,000. A contract has also been given to A. Guthrie & Co. of St. Paul, to construct a small engine terminal and an additional unit of the yard at Northtown (Minneapolis), Minn., which will cost about $250,000.

THE GULF, SABINE & RED RIVER is enlarging its facilities at Fal, La., its northern terminus, at a cost of about $150,000. A number of shop buildings and freight yards will also be constructed at once.

THE HOWARD TERMINAL is a new company which has been organized to build a railway several miles long on the Oakland, Cal., water front to connect the Western Pacific and the Southern Pacific lines.

THE ILLINOIS TERMINAL RAILROAD is making preliminary surveys for a line from Edwardsville, Ill., to O'Fallon, a distance of about 16 miles. The present plans are to extend the line to East Carondelet.

This road plans to build a three-story extension to its freight house at Ft. Dodge, Ia., which will cost about $40,000.

This company also is having plans made for an extension to the second floor of the freight house at Rockford, Ill.

This road is preparing preliminary plans for a one-story brick building 15 ft. high, 24 ft. wide and 200 ft. long, at Memphis, Tenn., which will be used as an office, storeroom, carpenter shop and pipe shop. A soaking vat also will be constructed.

THE LOS ANGELES & SALT LAKE has applied for a franchise to construct tracks through the city of Los Angeles, Cal., to the new Union Terminal Company's site. If this franchise is granted, an expenditure of approximately $3,500,000 will be involved for new trackage and other facilities.

THE MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE has awarded a contract to Roberts Brothers, Chicago, Ill., to grade a cut-off at Chippewa Falls, Wis., at an approximate cost of $100,000.

THE MISSOURI, KANSAS & TEXAS has ordered 2,000 tons of tie plates from the Sellers Manufacturing Company for 1918 delivery.

THE MONON will make rearrangements in its yards at La Fayette, Ind., involving expenditure of approximately $35,000.

THE NEW YORK, CHICAGO & ST. LOUIS is asking for bids for the construction of two freight houses at Cleveland, Ohio. The buildings will be 78 ft. by 433 ft. and 48 ft. by 72 ft., and will cost approximately $45,000 and $15,000, respectively.

THE NORFOLK SOUTHERN has awarded a contract to John T. Moffitt, Asheboro, N. C., for the erection of a combined freight and passenger station at Star, N. C. The building is to be 30 ft. wide by 118 ft. long, of frame construction and brick foundation, with a transfer platform 16 ft. by 200 ft. attached.

THE PENNSYLVANIA has awarded contracts to the Mathews Construction Company of Princeton, N. J., for the construction of a passenger station, a baggage and Adams Express building and a freight station, all to be erected at Princeton, N. J.

THE SAN ANTONIO, UVALDE & GULF is making some improvements at North Pleasanton, Tex., which will cost about $15,000. They include a new machine and wood shop, which will be a one-story building 168 ft. by 168 ft., new car sheds and additional track facilities.

THE SEABOARD AIR LINE has just awarded contracts for the construction of a coach and truck shop and an upholstery building at Portsmouth, Va., to replace those which were recently destroyed by fire. The coach and truck shop will be 92 ft. wide by 248 ft. 6 in. long, divided in two parts by a brick fire wall, while the upholstery building will be 32 ft. wide by 92 ft. long. Both buildings are of wood frame construction with 2½ in. Hy-rib siding, concrete foundations and a concrete wall 4 ft. above the floor. They are also equipped with steel rolling doors.

THE SOUTHERN PACIFIC has completed preliminary plans for a new $1,500,000 bridge between Oakland, Cal., and Alameda. The structure will be of the double leaf bascule type and will supplant the two existing bridges. Detailed plans will be prepared immediately and the actual construction will be started as soon as possible.

THE SOUTHWEST MISSOURI plans to extend its line from Baxter Springs, Kan., to Pilcher, Okla., a distance of about seven miles.

THE ST. LOUIS-SAN FRANCISCO has let a contract to Charles Cunliff, St. Louis, Mo., for the construction of an extension to a freight house at Tulsa, Okla. The building is to be 40 ft. by 330 ft., and will cost approximately $100,000. Other improvements involving the laying of additional tracks are being contemplated.

THE TUSCON, PHOENIX & TIDEWATER is a new company recently organized to construct a line from Tucson, Ariz., to Phoenix, a distance of about 120 miles. Surveys are now being made, but it is not expected that any grading will be done until after the war.

SUPPLY TRADE NEWS

PERSONAL

JAMES M. JOHNSON, treasurer of James B. Clow & Sons, died at his home in Chicago on June 10.

JACK COUGHLIN, treasurer of the Railway Motor Company of America, died at his home at Chicago on June 7.

JAMES H. SLAWSON, sales agent of the National Malleable Castings Company at Chicago, has been elected vice-president of the Joliet Railway Supply Company, with headquarters at Chicago.

FRANK W. MARVEL, sales manager of the Buda Company, Chicago, has been appointed special representative in eastern territory for the Indianapolis Switch & Frog Company, Springfield, Ohio.

A. R. TOPPING was elected secretary of the Walter A. Zelnicker Supply Company, St. Louis, Mo., at a recent meeting of that company. Mr. Topping has been associated with the Zelnicker Company for the past 11 years.

GEORGE C. ISBESTER of the Rail Joint Company, Chicago, Ill., has been appointed paymaster in the United States Navy, with the commission of lieutenant commander. He has been relieved of his duties with the Rail Joint Company and is located at 1218 Edison Building, Chicago.

A. FLETCHER MARSH, secretary of the Marsh & Truman Lumber Company, Chicago, who was appointed captain in the Quartermasters' Officers' Reserve Corps, Central Department, United States army, is now serving as assistant to the camp quartermaster at Ft. Sheridan, Ill.

CHARLES H. TRAPP has recently become confidential secretary to Mr. Zelnicker of the Walter A. Zelnicker Supply Company, St. Louis, Mo. Mr. Trapp was formerly associated with James Stewart & Co., in St. Louis, Denver and Idaho, and lately with Terrell Croft, consulting electrical engineer, St. Louis.

MARSHALL WILLIAMS, operating manager of the Pittsburgh division plants of the American Bridge Company, has been appointed assistant to the president, with headquarters at Pittsburgh, Pa. George W. Hunter, manager of the Gary, Ind., plant, succeeds Mr. Williams. P. W. Seil succeeds Mr. Hunter as manager of the Gary works.

THOMAS BERRY, one of the founders of the firm of Berry Brothers, varnish manufacturers, Detroit, Mich., died at his home in that city on May 24. Mr. Berry was born in Sussex, England, February 7, 1829, and came to Detroit in 1856 with his two brothers, with whom he established the firm which bears his name in 1858. He maintained an active interest in the business until shortly before his death.

F. H. TACKABERRY of the American Steel Export Company, New York, has been appointed traveling representative with the title of general agent. Mr. Tackaberry has recently been associated with the Ordnance Engineering Corporation of New York, and has held executive positions in such organizations as the Industrial Underwriter, Inc., the Locke Steel Belt Company, etc. Up to the time of the outbreak of disturbances in Mexico he was the representative of the Pennsylvania Steel Company in Mexico City and later the assistant general manager of sales of that company.

GENERAL

GASTON, WILLIAMS & WIGMORE, INC., announces the removal of its offices from the Guaranty Trust Company building to the Equitable building, New York City.

THE WISCONSIN BRIDGE & IRON COMPANY, Milwaukee, Wis., announces the removal of its contracting and engineering offices from the Colby-Abbott building to its works at North Milwaukee.

THE H. W. JOHNS-MANVILLE COMPANY has moved its Pittsburgh offices to new and larger quarters on the ground floor of the Westinghouse building, corner Ninth street and Pennsylvania avenue.

THE COLEMAN RAILWAY SUPPLY COMPANY is a new organization organized by W. W. Coleman and George E. Neil, with office at 30 Church street, New York, N. Y. The company will handle a general line of railway appliances and supplies.

THE FREELAND DERAILS AND NEWTON REPLACERS have been sold to the Q. & C. Company, New York, Chicago and St. Louis, and will hereafter be included with their other railway devices. The devices had previously been sold by the Hobart Alfree Company, Chicago.

THE ACME SUPPLY COMPANY changed its corporate name on June 1 to the Dunbar Manufacturing Company. The sales organization will remain substantially the same with the exception that a new sales office has been opened at St. Paul, Minn., with Rank & Goodell as sales representatives.

THE PITTSBURGH-DES MOINES STEEL COMPANY, Pittsburgh, Pa., has recently established a new Canadian branch at Chatham, Ont., which is completely equipped to manufacture and erect structural steel and plate work of all kinds. In addition to this, it will make a specialty here, as in the United States, of the manufacture and erection of elevated steel tanks.

THE UNITED STATES SUPREME COURT handed down a decision on May 21 in a case brought by the Railroad Supply Company, Chicago, against the Elyria Iron & Steel Company, Elyria, Ohio, for infringement of certain claims in patents for tie plates granted to B. Wolhaupter and since acquired by the Railroad Supply Company, that the tie plate manufactured and sold by the Elyria Iron & Steel Company did not infringe on these patents, thereby affirming the decree of the Circuit Court of Appeals for the Sixth District. In this decision the court called attention to the fact that the first patent for a tie plate "was issued in 1881 and beween that date and the date of issuing the first patent in suit to Wolhaupter in 1895, 26 patents were issued, and that in the 7 years between 1895 and 1902, when Wolhaupter's second patent in suit was issued, 19 more patents were issued for various forms of this simple device." The court further stated that the slight variations claimed for the patents in suit from the tie plates which had been designed previously did not constitute a patentable invention.

An identical suit was brought by the Railroad Supply Company, Chicago, against the Hart Steel Company, Elyria, O., and Guilford S. Wood, Chicago, selling agent for the Elyria company, and its manager, in the Circuit Court of the District of Northern Illinois on December 9, 1908, and a decision was tendered for the defendants on December 18, 1911. This case was appealed by the plaintiff to the Circuit Court of Appeals of the Seventh District, which rendered a decision on January 5, 1915, reversing the decision of the lower court. The case was then appealed by the defendants to the United States Supreme Court, which gave a decision for the defendants on May 21, the same date that the decision was rendered on the parallel case against the Elyria Iron & Steel Company.

On June 11, the Supreme Court entered an order granting counsel for the Railroad Supply Company leave to file a petition for a rehearing within 60 days.

TRADE PUBLICATIONS

POLE PULLERS.—Templeton, Kenly & Company, Chicago, has issued a folder describing the Simplex jack for pulling or straightening poles. Numerous cuts illustrating the use of the device are given, as well as letters from various users who testify to its advantages.

THE MYSTERY OF THE PUMP CAR.—The Hyatt Roller Bearing Company, Newark, N. J., has issued a little booklet containing a story, written by William Scheibel, about a race between two hand cars. The narrative is woven in an interesting style, leading effectively to the climax in which the advantage of the Hyatt Roller Bearing was demonstrated.

PREVENTING RAIL CORROSION.—The Texas Company, New York, has issued an eight-page pamphlet describing the oiling of rails and track fastenings as developed on the Lackawanna for the prevention of corrosion of these features of track construction, particularly as caused by brine drippings. Attention is drawn to the advantage of the use of Texas oils for this purpose and the booklet contains an insert giving a detailed drawing of the Neafie oil sprayer.

Another Monument to the Efficiency of "Gunite"

IN the building of the fifteen pit erecting shop at Portsmouth, Va., the Seaboard Air Line Railway Company determined to have a building which would be a credit to their road and insure absence of debits for its maintenance.

Greatest efficiency, durability, economy and service were sought for this locomotive erecting shop which was to provide 58,918 square feet of main floor space. Careful study was given to every detail of the problem, study which revealed the service, saving and safety which such roads as the Pennsylvania, the New York Central, the D. & H., the C. B. & Q., the B. & O., the P. L. E. & W., the Lehigh Valley, the Atlantic City & Shore Railroad, and so many others had secured through "GUNITE."

And the CEMENT-GUN The Field Gun of General Satisfaction

And what was the result? That erecting shop was shot with "Gunite," that product which defies the elements. Defies the elements? Yes, witness that other monument to the efficiency of Gunite, the Lehigh Valley Grain Elevator which withstood that great explosion on Black Tom Island.

Just as all Americans know the strength that stands behind a Liberty Bond, so "the men who run the arteries of our nation's life," know that "Gunite," the product of the Cement-Gun, is stronger in bond, more impervious and of a quality impossible to attain in sand and cement mortar, mixed by hand or by any other machine processes.

Send for the Cement-Gun Booklet. Know the savings in time and money insured by

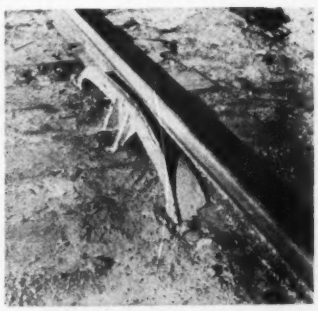
A Cement Gun for Every Division

Remember the Cement-Gun can be purchased outright from us and used by any one, as it is not a restricted article.

CEMENT GUN COMPANY, Inc. Allentown, Pennsylvania

New York Office: 30 Church Street

E. R. AYERS 1414 Fisher Building Chicago, Ill.	JOHN A. TRAYLOR Newhouse Bldg. Salt Lake City, Utah	TAYLOR ENGINEERING CO. 538 Central Bldg. Seattle, Washington	TAYLOR ENGINEERING CO. Vancouver, British Columbia	A. R. ROBERTS 727 Traders Bank Building Toronto, Ont., Canada



Note the foot guard and the wearing insert. Weight 80 lbs.

GUARD RAILS

Something New and Different

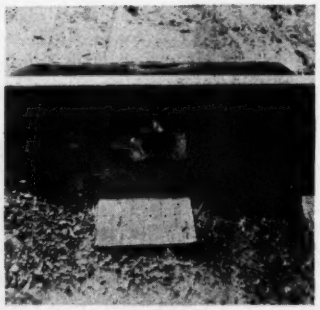
The results are just as attractive as the appearance

Save $8.00 per Turnout. Write for catalog

National Steel Products Co., Inc.

Formerly Bohannan Easer Joint Co.

ENSLEY ALABAMA



Note the key locked with a spike and the length of guard rail

EMPLOYMENT BUREAU

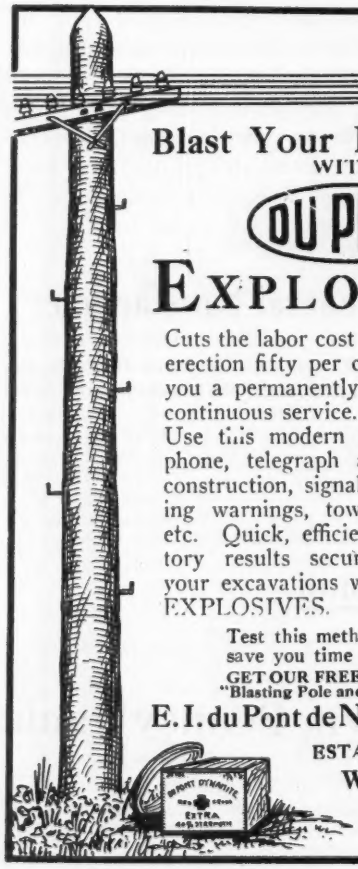
Use this section when seeking a new man, a new position, or when buying or selling second-hand equipment.

Rate is 2c a word a month. Minimum charge $1.00. Remittance must accompany each order.

ADDRESS

RAILWAY MAINTENANCE ENGINEER

Classified Advertising Department Transportation Bldg., Chicago, Illinois



Blast Your Pole Holes WITH DU PONT EXPLOSIVES

Cuts the labor cost of pole and post erection fifty per cent, and insures you a permanently secure line and continuous service.

Use this modern method in telephone, telegraph and power line construction, signal systems, crossing warnings, tower foundations, etc. Quick, efficient and satisfactory results secured by blasting your excavations with DU PONT EXPLOSIVES.

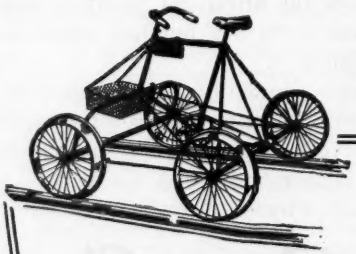
Test this method. It will save you time and money.

GET OUR FREE BOOKLET: "Blasting Pole and Post Holes."

E. I. du Pont de Nemours & Co.

ESTABLISHED 1802

Wilmington, Delaware



Why Repeat

Why repeat that which is a well-known fact to railroad men, the men who buy and the men who use

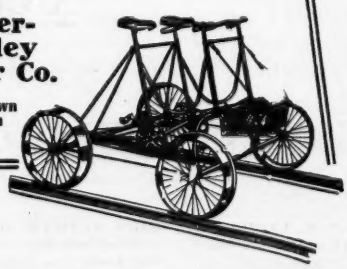
Inspection Cars

Hartley & Teeter Light Inspection Cars are the strongest and lightest known. Why repeat that fact when a constant stream of repeat orders proves it constantly.

Such is the fact—the reason—ask the men who use them or send for our new catalogue.

Teeter-Hartley Motor Co.

Hagerstown Indiana



TREATING RAILWAY TIMBERS

TO OBTAIN THE FULL MECHANICAL LIFE

The preservative must be pure, stable, of deep penetrance, insoluble in water and unaffected by extremes in temperature

TO ACCOMPLISH THIS

Reilly Improved Creosote Oil

IS THE ONE SURE WAY

We urge you to investigate and advise us of your requirements

WE ALSO MANUFACTURE

Maintenance of Way Oil No. 1

Maintenance of Way Oil No. 2

Maintenance of Way Oil No. 3

REPUBLIC CREOSOTING COMPANY

1614 Merchants Bank Building

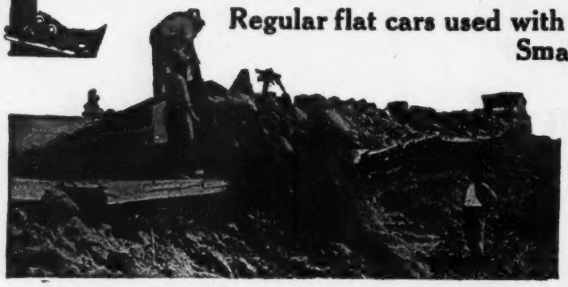
Indianapolis, Indiana

PLANTS

Indianapolis Minneapolis Mobile Seattle

LIDGERWOOD RAPID UNLOADER

Regular flat cars used with this method, reducing dead weight haulage. Smaller crews required.



Load can all be dumped in one place.
Load can be spread along any distance.
Cars unloaded at lowest cost.

Send for Bulletin

Hoists for Every Railroad Service

Lidgerwood Mfg. Co. 96 Liberty Street **New York**

Philadelphia Pittsburgh Chicago Los Angeles Seattle

FROGS — SWITCHES — STANDS

Manganese and Built-Up Construction

IN STOCK for IMMEDIATE SHIPMENT

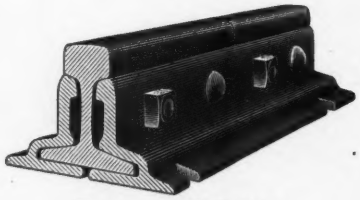
THE INDIANAPOLIS SWITCH & FROG COMPANY

NEW YORK SPRINGFIELD, OHIO CHICAGO

The Rail Joint Co.

GENERAL OFFICES:

61 Broadway New York City



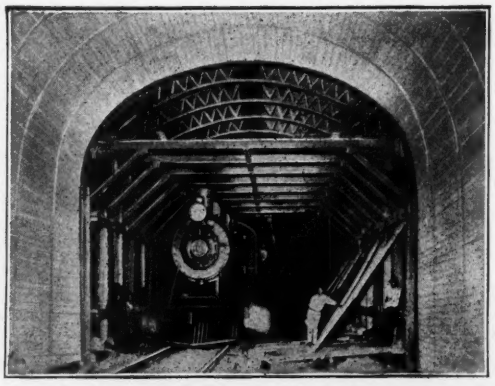
Continuous Rail Joint

Makers of Continuous, Weber, Wolhaupter and 100% rail joints.

Standard—Insulated—Step—Frog and Switch Types.

Grand Prize San Francisco 1915

Protected by Patents



RAPID WORK—LOWER COST BETTER RESULTS AND NO DELAY IN TRAFFIC

These are some of the advantages secured by railroads that line tunnels by the

Pneumatic Method of Mixing and Conveying Concrete
(Patented)

Labor cost and time are reduced to one-third. Less equipment is required—No other mixer, no cars, no tracks, no elevated platforms, no locomotives.

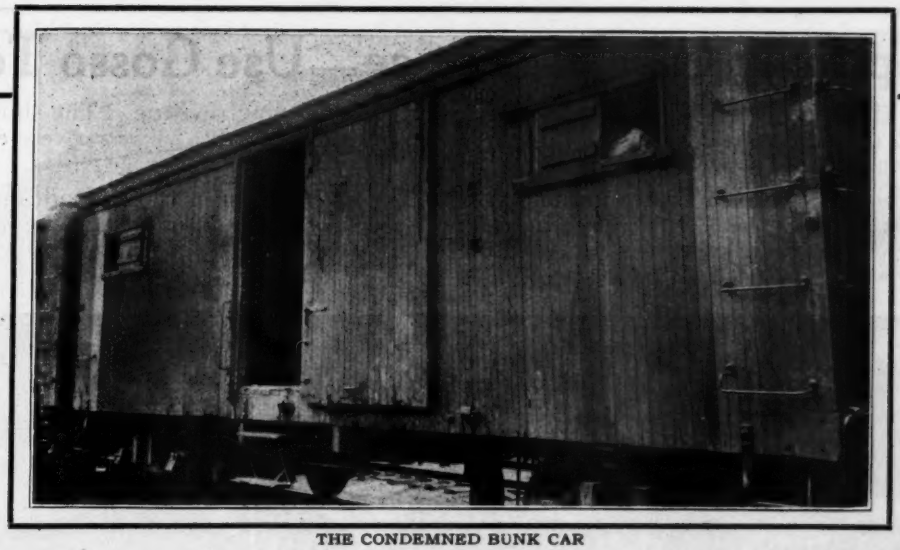
Tests of small blocks taken at random from the Wilson Avenue Tunnel, Chicago, for testing, proved not alone their exceeding density, but in many cases proved so hard that the equipment of the Underwriters' Laboratory could not crush them.

Used by C. B. & Q. and other leading roads. They secure better work at half the cost of other methods.

We lease equipment, or do work on contract.
Send for descriptive literature.

CONCRETE MIXING & PLACING CO.

123 W. Madison St. - - CHICAGO



THE CONDEMNED BUNK CAR

How Do You House Your Track Gangs?

Railroads are using two methods of housing construction gangs—the old and the improved—the defective and the sanitary—the wrong and the right way. How do they compare?

THE CONDEMNED CAR		TRUCSON STEEL BUILDING
Old wooden box car.	MATERIAL	All-steel unit sections with steel-tile roof.
Obsolete for road service.	CONSTRUCTION	Shipped crated; assembled with a hammer; rigidly connected without rivets.
Non-expansive; can be made no larger and no smaller.	FLEXIBILITY	Expansive to any size desired—the unit system forgets about limits.
Oil-soaked and filled with dirt from years of service.	SANITATION	Absolutely cleanly—can be flushed with a hose.
Fixed wooden bunks; inaccessible joints harboring vermin.	EQUIPMENT	Movable metallic—all parts accessible; vermin-proof.
Highly inflammable—a danger to contents and surroundings.	FIRE MENACE	Being all-steel is absolutely fireproof.
May be moved if on tracks; otherwise not.	PORTABILITY	May be removed "knocked down" and re-erected an indefinite number of times at different locations.
Its last appearance before being broken up.	PERMANENCE	Lasts forever, with practically no expense for maintenance.
The torch or the axe comes next; worth only firewood value.	DISMANTLING	Labor the only cost of changing. Worth as much down as up.

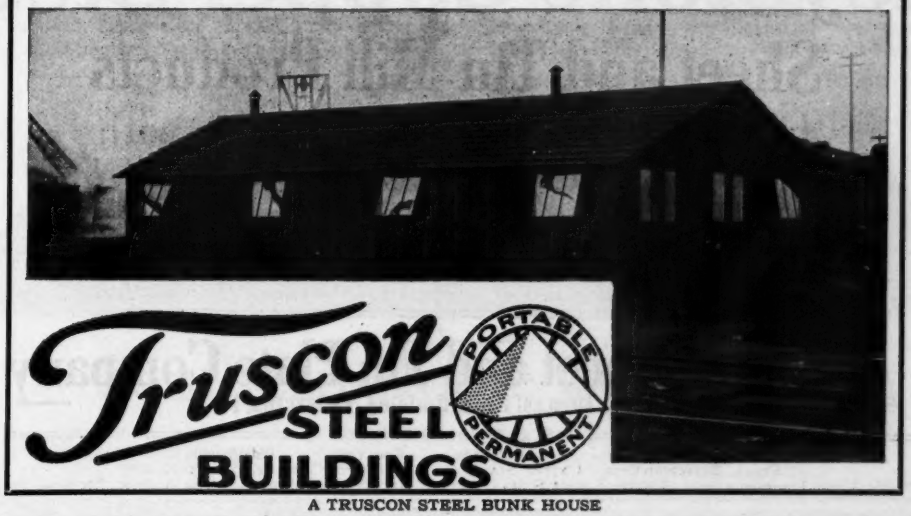
Send for the "Trucson" Book

KAHN Building Products

Trussed Concrete Steel Company

Representatives in Principal Cities **Railroad Department, Youngstown, Ohio**

KAHN Building Products

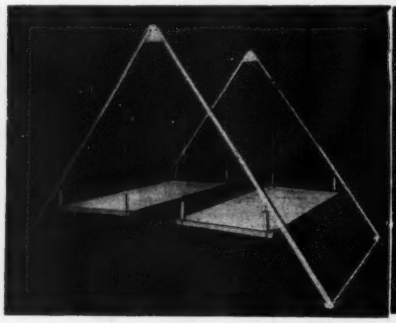


A TRUSCON STEEL BUNK HOUSE

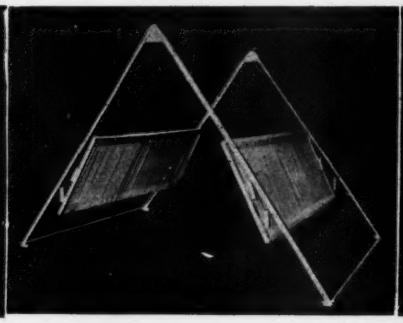
Keep Your Cars in Service—Use Gosso Tents

At this time every car fit for service should be earning revenue. The shortage of cars and their present value in service make the use of cars for housing laborers a very expensive proposition—aside from the expense of fitting them with bunks.

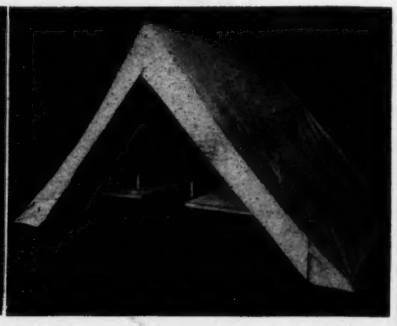
Substitute Gosso Camp Outfits. With these tents, camps can be made anywhere along the right of way without spurring out cars. The Gosso camp outfit folds compactly into a box 10"x12"x4'9" long; easily loaded and unloaded; can be set up ready for use in a few minutes by the men on their own time.



Frame ready for tent.



Beds folded up.



Ready for use.

Aside from being more sanitary and more economical than bunk cars, Gosso tents are *more comfortable.* They keep the men better satisfied, which means greater efficiency.

A Gosso outfit will last for years without maintenance expense. The first cost is the only cost, and that is reasonable.

Try Gosso Tents and You Will Know Their Advantages

The Gosso Co., 14 E. Jackson Blvd., Chicago

Quality— KEYSTONE COPPER STEEL *—Service*

Keystone Copper Steel

Sheet and Tin Mill Products

Highest standards of manufacture with which is combined superior resistance to rust. Our Keystone booklets are of particular interest to all users of sheet metal.

Apollo-Keystone Galvanized is unequaled for Culverts, Flumes, Etc.

American Sheet and Tin Plate Company

GENERAL OFFICES: Frick Building, PITTSBURGH, PA.

DISTRICT SALES OFFICES:

Chicago Cincinnati Denver Detroit New Orleans New York Philadelphia Pittsburgh St. Louis

Export Representatives: UNITED STATES STEEL PRODUCTS COMPANY, New York City

Pacific Coast Representatives: UNITED STATES STEEL PRODUCTS COMPANY, San Francisco, Los Angeles, Portland, Seattle

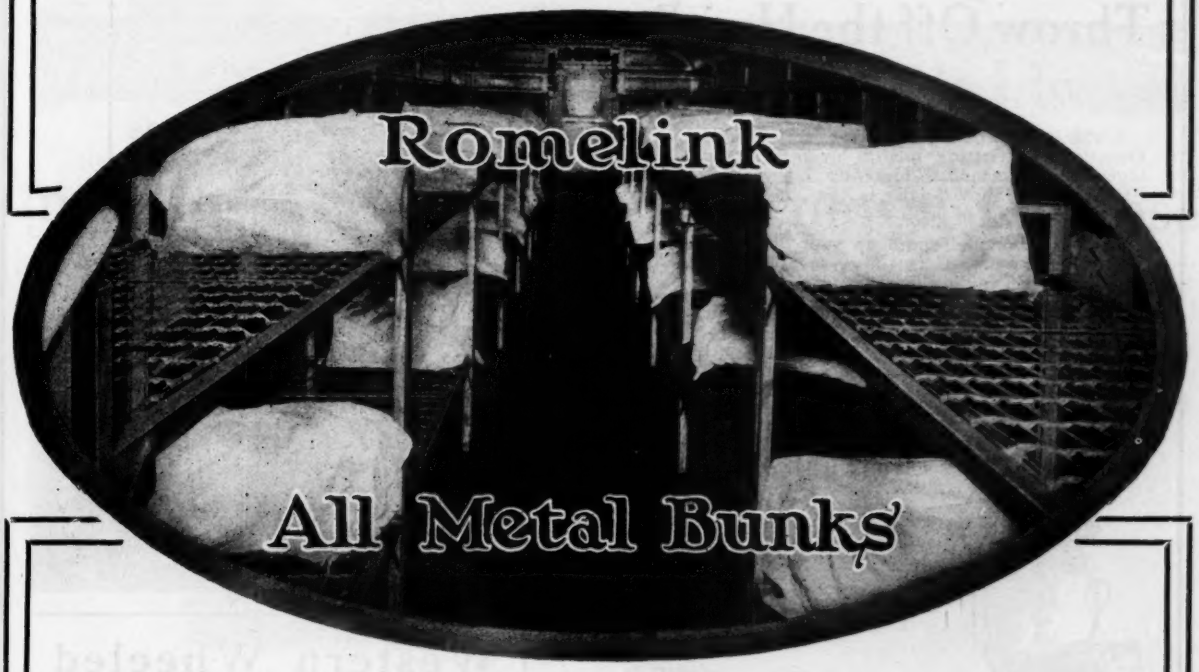


Figure the Bunk Proposition This Way

Suppose you are building a camp equipped with wooden bunks. Lumber, conservatively rated, costs from $35 to $40 a thousand—a fancy figure compared with prices three years ago. And when you consider labor, you are up against a real problem.

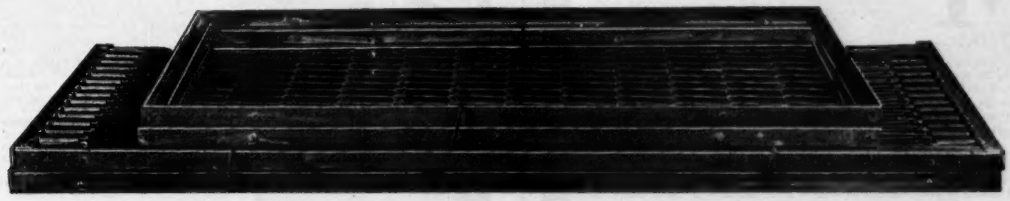
Carpenters are scarce at four dollars and a half a day and over.

Now figure your costs. A hundred feet of lumber makes a double bunk and two carpenters will build four bunks a day bringing your cost per bunk around $6.50. All you have for your money is a temporary and unsanitary makeshift—a hard hot bed that is impossible to keep clean and vermin-free.

Contrast this costly and unsatisfactory condition with the economy and satisfaction of installing Romelink All Metal Bunks. These bunks are of solid steel, hand riveted, and fitted with Romelink patent *sagless* springs.

They are erected in a jiffy—a section hand can do it—and they stay in place, snug and tight, for years. They last a lifetime. No crevices to collect dirt or harbor vermin. Perfect circulation of air keeps bedding clean and wholesome.

When you are ready to break camp the Romelink Bunks are easily knocked down and folded compactly for shipping to another camp. No time lost or material wasted in re-erecting. Suppose we talk over the bunk proposition in detail and quote on your requirements. Ask us to-day.



Southern Rome Company

Baltimore Maryland

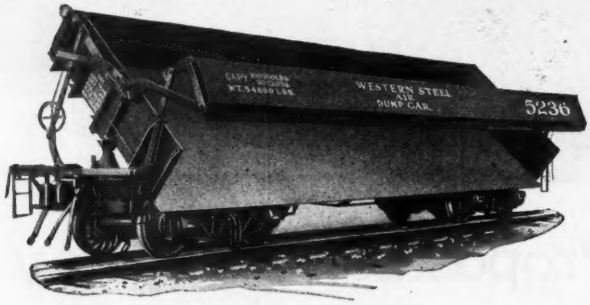
Throw Off the Handicap of Labor Shortage

A stiff labor problem confronts every Maintenance-of-Way Department. Getting men is next to impossible and the high wages demanded force up maintenance costs. The Flat Car and Shovel gang is too slow; it costs too much money; it is out of date.

Cut out labor and **speed up your work** by using modern Western Air Dump Cars. They save more than 60 per cent in the cost of handling material, compared with the old way.

You need no laborers for ditching. Couple your Ditcher between two Western Air Dump Cars. The train crew can dump the load and dodge traffic, without delays, while doing it.

You need Western equipment now more than ever before. Tell us what your requirements are and we will make such recommendations as are entirely reasonable.



Western Wheeled Scraper Co.
AURORA, ILL.

Marion

Steam Shovels, Dredges, Draglines and Kindred Machinery

WHEN someone says "See America First" you immediately think of the Great Northern Railway; in just the same way do the officials of that famous system think "Marion" in connection with the terms "Ditching Machines," "Steam Shovels," or any kind of "Excavating Machinery."

For the Great Northern Railway and The Marion Steam Shovel Company are business friends in the strictest sense;—

Marion Ditchers and Marion Shovels Do "Great Northern's" Big Work

and small work, too—whether it's constructing new line or opening up ditches along existing rights-of-way.

May we suggest that an investigation might develop just as interesting possibilities for using "Marions" in your own work?

We should heartily welcome that, and will gladly assist you in making it. Your request for particulars will not obligate you.

The Marion Steam Shovel Company, Marion, Ohio

Branches: Atlanta, Chicago, New York, Philadelphia, San Francisco, Seattle

225 ESTABLISHED 1884

Right There—

is where its strength lies. Right at the center of the joint—where most joints are weak—the Bonzano-Thomson possesses its **greatest strength.** The reason is in the vertical depending flange. Built like a bridge girder, it fulfills the fundamental law of beam design—the strength varying directly as the square of the depth.

This strength factor, together with the Thomson patent of metal distribution throughout the vertical section, makes the Bonzano-Thomson Rail Joint.

"The Joint as Strong as the Rail"

Write for complete information

The Q AND C Co.

New York 90 West St.
St. Louis Ry. Exch. Bldg.
Chicago Peoples Gas Bldg.

R-70

Insuring Against Culvert Renewal Expense

Twenty-four Inch National Lock-Joint Cast-Iron Pipe installed in fill 28 ft. high on the P. R. R. System.

Here are three views taken on the Pennsylvania's new line between Indianapolis and Frankfort, showing some big fills under construction, and more, showing how the Pennsylvania insures against culvert renewal expense by installing

National Lock-Joint Cast-Iron Pipe

Wood will rot, steel or refined iron rust, clay or earthenware disintegrate, but this culvert pipe, made from remelted Alabama Pig Iron, remains as permanent as your road bed. That is why over forty of the large trunk lines of this country *specify* and *insist* on National Lock-Joint Cast-Iron Pipe.

The Pipe of Short Units, Long Service and Low Costs

Forty-two Inch National Lock-Joint Cast-Iron Culvert Pipe under a fill 45 feet high and 42 feet wide at the top, on the P. R. R. System.

The pipe which, due to its short units, permits easy handling, that can be installed by the ordinary section gang without accessory of any kind. The pipe with the joint that locks effectively, *prevents* separation, and *assures* alignment. The pipe that is sold by the foot, of low first cost, and which assures economy from the start and insures economy thru the years. Is it any wonder National Lock-Joint Cast-Iron Pipe is the standard of so many railroads, and that they look to it for

Installation of National Lock-Joint Cast-Iron Culvert Pipe under a fill 40 feet high and 38 feet wide at top, on the P. R. R. System.

Insuring Against Culvert Renewal Expense

CATALOGUE AND PRICES ON REQUEST

AMERICAN CASTING CO.
Birmingham, Ala.

Chicago Office: - Peoples Gas Building
New England Representative
Fred A. Haudlette & Son, Boston, Mass.
St. Louis Representative
H. P. Webb, - - Wainwright Building
St. Paul Office
Contractor's Supply and Equipment Co.
Blair & Co., Bankers Investment Co.,
San Francisco, Cal.

The Buyer's Interest in Wasteless Advertising

BUYERS who appreciate that waste in selling must eventually be passed on to them in some form are paying more and more attention to the sales methods of the concerns seeking their business.

> The extravagant use of space in publications of general circulation to advertise a commodity or a service appealing chiefly to a certain well-defined class, is not only poor judgment, but *it is an economic waste.*

Can you imagine an intelligent salesman, with a proposition for a steel mill or a dry goods store, calling at every office in town in an effort to locate a prospect? How needlessly wasteful to adopt similar methods in advertising, which is simply an improved means of accomplishing certain necessary steps of a sale.

On the other hand, the seller who uses the business papers reaching *only* the class interested in his message, is employing the most direct, efficient and economical method of getting in touch with prospective buyers.

> Properly used, the good business paper bears the same relation to the sales department that an improved machine does to the production department. Better selling methods go hand in hand with better manufacturing methods.

To encourage wasteless advertising, the most efficient modern means of bringing buyer and seller together, there is every reason why the discriminating buyer should give preferred consideration to the concern that tells its business story in the buyer's own business paper.

Ask this office anything you want to know about Business Papers or Business Paper Advertising.

THE ASSOCIATED BUSINESS PAPERS · INC.

The International Organization of Trade, Technical and Class Publications

Headquarters, 220 West 42nd Street New York

LIST OF MEMBERS

Each member has subscribed to the 10 "Standards of Practice," a high code of ethics covering all departments of business paper publishing.

Advertising & Selling
American Architect
American Blacksmith
American Exporter
American Hatter
American Machinist
American Paint & Oil Dealer
American Printer
American School Board Journal
Architectural Record
Automobile, The
Automobile Dealer & Repairer
Aviation & Aeronautical Engineering
Boot & Shoe Recorder
Brick & Clay Record
Buildings & Building Management
Bulletin of Pharmacy
Canadian Grocer
Canadian Railway & Marine World
Cement World
Clothier & Furnisher
Coal Age
Concrete
Domestic Engineering
Drygoodsman, The
Dry Goods Economist
Dry Goods Reporter
Editor & Publisher
Electrical Review & Western Electrician
Electrical World
Electric Railway Journal
Electric Traction
Engineering & Mining Journal
Engineering News-Record
Farm Machinery—Farm Power
Furniture Manufacturer & Artisan
Grand Rapids Furniture Record
Haberdasher, The
Hardware Age
Hide & Leather
Hotel Monthly
Illustrated Milliner
Implement Age
Industrial Arts Magazine
Inland Printer
Iron Age
International Trade
Lumber Trade Journal
Lumber World Review
Manufacturing Jeweler
Marine Engineering
Metal Worker, Plumber & Steam Fitter
Metallurgical & Chemical Engineering
Modern Hospital
Motor Age
Motor World
National Builder
National Druggist
National Petroleum News
Power
Practical Engineer
Railway Age Gazette
Railway Electrical Engineer
Railway Maintenance Engineer
Railway Mechanical Engineer
Railway Signal Engineer
Shoe & Leather Reporter
Shoe Findings
Shoe Retailer
Tea & Coffee Trade Journal
Textile World Journal
Transfer & Storage
Woodworker